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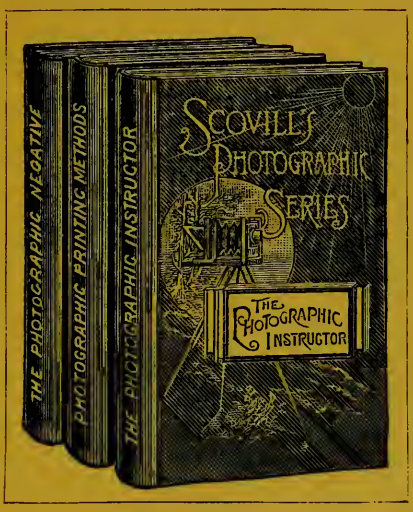
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FOR 1893

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EDITOR OF THE PHOTOGRAPHIC TIMES.

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PREFACE.

ANOTHER volume, the seventh, of THE AMERICAN ANNUAL OF PHOTOGRAPHY AND PHOTOGRAPHIC TIMES ALMANAC is herewith presented to the photographic fraternity. In doing so the editors and publishers of the book desire gratefully to acknowledge the wide-spread and active interest which has been manifested in its preparation by distinguished photographers on two hemispheres.

With every succeeding issue of such a book the work of preparation becomes more arduous. The demand for the book constantly increases and thus necessitates an ever larger edition, which involves each year an earlier date of publication in order to allow time for printing and binding the increasing edition, and yet be ready for the holidays. The time in which to prepare the book is, therefore, curtailed while the amount of work becomes greater.

Last year the edition reached 16,000 copies, but that was found to be insufficient for the demand. Two thousand more books are, therefore, printed of the present volume, and it is to be hoped that every one desiring a copy this year will be supplied.

The articles are greater in number than heretofore, and we believe will prove even more valuable to our readers. The pictures are also more numerous than ever before, and easily maintain the high standard established in the first volume of THE AMERICAN ANNUAL OF PHOTOGRAPHY. The tables, formulæ, etc., have been thoroughly revised by experts and have been brought up to date with many additions of new and important matter.

All this has involved a great amount of conscientious labor on the part of the collaborators, and the present gratifying result would have been well nigh unattainable without the valuable assistance of the eminent authorities who have aided the editors in their work. Though the standard was raised high the feeling is indulged by all those who have been engaged in the preparation of this volume of THE AMERICAN ANNUAL OF PHOTOGRAPHY that, thanks to writers, photographers and illustrators, it is an adequate record of photographic progress during the past year. That, after all, is all that could be desired.



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Sweet, Wallach & Co..... 68
Swift & Sons, Jas..... 7

Tablets (Acid) 88
Thomas, S. A..... 91
Thornton-Pickard Mfg. Co 10
"Three Crown" Albumen Paper..... 43
Trays..... 115
Trays, Developing 69
Triad Camera Box, The..... 108
Trier & Son, S..... 110
Tripods.....64, 65, 141

Washing Boxes. 142
Waterbury Finder..... 153
Watson & Sons, W..... 5, 6
Waymouth Vignette Papers 139
White, Otis C..... 61
Whittlesey & Co., Charles W..... 150
Wilkinson Company, The.....37, 38, 39, 40
Williams, Brown & Earle..... 139
Willis & Clements..... 151
Wilson & Co., G. W..... 8, 9
Wilson-Hood-Cheyney Co 89
Wolfe, M 35
Wonder Equipments..... 137
Worcester Plate Works..... 153
Wuestner's New Eagle Dry-Plate Works 47

REFERENCE CALENDAR FOR THREE YEARS.

1892

	S	M	T	W	T	F	S
Jan.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..
Feb.	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	..	..	..	..	..
Mar.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
April	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30

	S	M	T	W	T	F	S
May	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
June	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	..	..
July	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..
Aug.	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..

	S	M	T	W	T	F	S
Sept.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
Oct.	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..
Nov.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	..	..	..
Dec.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31

1893

	S	M	T	W	T	F	S
Jan.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Feb.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	..	..	..	..
Mar.	..	..	.	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
April	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	..	..	..	..	..	..

	S	M	T	W	T	F	S
May	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
June	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
July	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..
Aug.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..

	S	M	T	W	T	F	S
Sept.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
Oct.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Nov.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	..	..
Dec.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..

1894

	S	M	T	W	T	F	S
Jan.	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
Feb.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	..	..	..
Mar.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
April	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	..	..	..	..	..
	..	..	..	..	..	..	..

	S	M	T	W	T	F	S
May	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
June	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
July	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Aug.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
	..	..	..	..	..	..	

	S	M	T	W	T	F	S
Sept.	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	..	..	..	..	..	..
Oct.	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
Nov.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
Dec.	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	.	..	..	..	..

CENTURY CALENDAR.

For explanation see opposite page.

Table 1. Years 1800-1901.

For economy of space, the century prefixes "18" and "19" have been omitted.

00	01	02	03	**04**	04	05	
06	07	**08**	08	09	10	11	
12	12	13	14	15	**16**	16	
17	18	19	**20**	20	21	22	
23	**24**	24	25	26	27	**28**	
28	29	30	31	**32**	32	33	
34	35	**36**	36	37	38	39	
40	40	41	42	43	**44**	44	
45	46	47	**48**	48	49	50	
51	**52**	52	53	54	55	**56**	
56	57	58	59	**60**	60	61	
62	63	**64**	64	65	66	67	
68	68	69	70	71	**72**	72	
73	74	75	**76**	76	77	78	
79	**80**	80	81	82	83	**84**	
84	85	86	87	**88**	88	89	
90	91	**92**	92	93	94	95	
96	96	97	98	99	00	01	

Table 2. 1st day of Month.

JAN	W	Th	F	S	S	M	Tu
FEB	S	S	M	Tu	W	Th	F
MAR	S	S	M	Tu	W	Th	F
APL	Tu	W	Th	F	S	S	M
MAY	Th	F	S	S	M	Tu	W
JUNE	S	M	Tu	W	Th	F	S
JULY	Tu	W	Th	F	S	S	M
AUG	F	S	S	M	Tu	W	Th
SEP	M	Tu	W	Th	F	S	S
OCT	W	Th	F	S	S	M	Tu
NOV	S	S	M	Tu	W	Th	F
DEC	M	Tu	W	Th	F	S	S

Table 3. Days of Month.

1	S	M	Tu	W	Th	F	S	1
2	M	Tu	W	Th	F	S	S	2
3	Tu	W	Th	F	S	S	M	3
4	W	Th	F	S	S	M	Tu	4
5	Th	F	S	S	M	Tu	W	5
6	F	S	S	M	Tu	W	Th	6
7	S	S	M	Tu	W	Th	F	7
8	S	M	Tu	W	Th	F	S	8
9	M	Tu	W	Th	F	S	S	9
10	Tu	W	Th	F	S	S	M	10
11	W	Th	F	S	S	M	Tu	11
12	Th	F	S	S	M	Tu	W	12
13	F	S	S	M	Tu	W	Th	13
14	S	S	M	Tu	W	Th	F	14
15	S	M	Tu	W	Th	F	S	15
16	M	Tu	W	Th	F	S	S	16
17	Tu	W	Th	F	S	S	M	17
18	W	Th	F	S	S	M	Tu	18
19	Th	F	S	S	M	Tu	W	19
20	F	S	S	M	Tu	W	Th	20
21	S	S	M	Tu	W	Th	F	21
22	S	M	Tu	W	Th	F	S	22
23	M	Tu	W	Th	F	S	S	23
24	Tu	W	Th	F	S	S	M	24
25	W	Th	F	S	S	M	Tu	25
26	Th	F	S	S	M	Tu	W	26
27	F	S	S	M	Tu	W	Th	27
28	S	S	M	Tu	W	Th	F	28
29	S	M	Tu	W	Th	F	S	29
30	M	Tu	W	Th	F	S	S	30
31	Tu	W	Th	F	S	S	M	31

EXPLANATION OF CENTURY CALENDAR.

(See opposite page.)

To ascertain the day of the week corresponding to any date from the 1st January, 1800, to the 31st of December, 1901, both inclusive: find the given year in Table 1, and follow downward the vertical column containing it, until reaching, in Table 2, the horizontal line beginning with the given month; at the intersection of the column and line will be found the day of the week with which the month commences. In Table 3, find the vertical column beginning with that day of the week, and follow it downward until reaching the horizontal line beginning with the given day of the month; at the intersection of the column and line will be found the day of the week corresponding to the given year, month and day.

NOTE.—Leap-years will be found entered twice in Table 1; first in heavy-faced type; and afterward in ordinary characters. The first entry is to be used when the given date is in January or February of the given year; the second, (ordinary type), when falling in any other month.

EXAMPLES.—Given the 29th of February, 1824:—To find the day of the week on which it fell. Under the first entry of 24, in Table 1, and opposite Feb., in Table 2, is found Sunday. Under Sunday in Table 3, and opposite 29, is found Sunday, which is the required day of the week. Given the 22d of December, 1864:—Under the second entry of 64, in Table 1, and opposite Dec., in Table 2, is found Th. In Table 3, under Th., and opposite 22, is found Th., which is the required day of the week. Given the 12th of September, 1855:—Under 55, in Table 1, and opposite Sept., in Table 2, is found S. In Table 3, under S and opposite 12, is found W., which is the required day of the week.

ECLIPSES IN 1893.

NOTE.—*Local mean time for the latitude of New York City is used in reckoning eclipses, sunset and sunrise. Subtract four minutes to change the reckoning to Eastern standard time of 75th meridian.*

Moon's phases are calculated for Eastern standard time. "Morn." is understood to extend from Midnight to Noon; "Eve." from Noon to Midnight.

There will be two eclipses in 1893.

I.—*A total eclipse of the Sun*, April 15 and 16, invisible in North America.

II.—*An annular eclipse of the Sun*, October 9, visible as a partial eclipse upon the Sun's southern limb in the Gulf and Western States.

THE SEASONS.

SPRING begins	March 18, 10 p.m.	AUTUMN begins	September 21, 9 a.m.
SUMMER begins	June 19, 6 p.m.	WINTER begins	December 19, 11 p.m.

CHURCH DAYS.

Septuagesima	Jan. 29	Easter Sunday	April 2
Sexagesima	Feb. 5	Low Sunday	April 9
Quinquagesima	Feb. 12	Rogation Sunday	May 7
Ash Wednesday	Feb. 15	Ascension Day	May 11
Quadragesima	Feb. 19	Whitsunday [Pent.]	May 21
Mid Lent Sunday	March 5	Trinity Sunday	May 28
Palm Sunday	March 26	Corpus Christi	June 1
Good Friday	March 31	Advent Sunday	Dec. 3

CHRONOLOGICAL CYCLES.

Dominical Letter	A
Epact	12
Golden Number (Lunar Cycle)	13
Solar Cycle	26
Roman Indiction	6

CHRONOLOGICAL ERAS.

The year 1893, which comprises the latter part of the 117th and the beginning of the 118th year of the INDEPENDENCE OF THE UNITED STATES OF AMERICA, corresponds to the year 6606 of the JULIAN PERIOD; the years 7401-7402 of the BYZANTINE ERA; the years 5653–54 of the JEWISH ERA; the year 2646 since the FOUNDATION OF ROME, according to Varro; the year 2669 of the OLYMPIADS; the year 1609 of the era of DIOCLETIAN; the year 2553 of the JAPANESE ERA; the years 1310-11 of the MOHAMMEDAN ERA.

The 1st day of January of the year 1893 is the 2,412,100th day since the commencement of the JULIAN PERIOD.

The JULIAN CALENDAR, which is still used in the Russian Empire, dates twelve days back of our own—the GREGORIAN CALENDAR. Thus a letter from St. Petersburg dated January 1st was really written on January 13th.

The Russians generally use, in official documents and frequently in business correspondence, two dates, which they call "old style" and "new style;" and in Alaska three dates have been used on their documents, because the early navigators forgot to make allowance for the crossing of the 180th meridian in sailing from Siberia to North America.

JANUARY, 1893.

1st MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises.	N. Y. City. Sun sets.
			H. M.	H. M.
1	1	S	7 25	4 43
2	2	M	7 25	4 44
3	3	Tu	7 25	4 45
4	4	W	7 25	4 46
5	5	Th	7 25	4 47
6	6	F	7 25	4 48
7	7	Sa	7 25	4 49
8	8	S	7 24	4 50
9	9	M	7 24	4 51
10	10	Tu	7 24	4 52
11	11	W	7 24	4 53
12	12	Th	7 23	4 54
13	13	F	7 23	4 55
14	14	Sa	7 23	4 56
15	15	S	7 22	4 57
16	16	M	7 22	4 59
17	17	Tu	7 21	5 00
18	18	W	7 21	5 01
19	19	Th	7 21	5 02
20	20	F	7 20	5 03
21	21	Sa	7 19	5 04
22	22	S	7 18	5 05
23	23	M	7 17	5 07
24	24	Tu	7 17	5 08
25	25	W	7 16	5 09
26	26	Th	7 16	5 10
27	27	F	7 15	5 11
28	28	Sa	7 14	5 13
29	29	S	7 13	5 14
30	30	M	7 12	5 15
31	31	Tu	7 12	5 16

Moon's Phases.

Full M., Jan. 2, 8 h. 41 m., morn.
Last Q., Jan. 9, 5 h. 28 m., eve.
New M., Jan. 17, 8 h. 28 m., eve.
First Q., Jan. 25, 1 h. 27 m., morn.
Full M., Jan. 31, 9 h. 11 m., eve.

FEBRUARY, 1893.

2d MONTH. 28 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises.	N. Y. City. Sun sets.
			H. M.	H. M.
32	1	W	7 11	5 18
33	2	Th	7 10	5 19
34	3	F	7 09	5 20
35	4	Sa	7 07	5 21
36	5	S	7 06	5 22
37	6	M	7 05	5 23
38	7	Tu	7 04	5 25
39	8	W	7 03	5 26
40	9	Th	7 02	5 27
41	10	F	7 01	5 28
42	11	Sa	7 00	5 30
43	12	S	6 58	5 31
44	13	M	6 57	5 32
45	14	Tu	6 56	5 34
46	15	W	6 55	5 35
47	16	Th	6 53	5 36
48	17	F	6 52	5 37
49	18	Sa	6 51	5 39
50	19	S	6 49	5 40
51	20	M	6 48	5 41
52	21	Tu	6 46	5 43
53	22	W	6 45	5 44
54	23	Th	6 44	5 45
55	24	F	6 42	5 46
56	25	Sa	6 41	5 48
57	26	S	6 39	5 49
58	27	M	6 38	5 50
59	28	Tu	6 37	5 51

Moon's Phases.

Last Q., Feb. 8, 3 h. 11 m., eve.
New M., Feb. 16, 11 h. 16 m., morn.
First Q., Feb. 23, 9 h. 14 m., morn.

MARCH, 1893.

3d MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
60	1	W	6 35	5 53
61	2	Th	6 34	5 53
62	3	F	6 32	5 54
63	4	Sa	6 30	5 55
64	5	☉	6 29	5 56
65	6	M	6 27	5 57
66	7	Tu	6 25	5 58
67	8	W	6 24	5 59
68	9	Th	6 22	6 00
69	10	F	6 20	6 01
70	11	Sa	6 19	6 02
71	12	☉	6 17	6 03
72	13	M	6 16	6 04
73	14	Tu	6 14	6 05
74	15	W	6 12	6 06
75	16	Th	6 11	6 08
76	17	F	6 09	6 09
77	18	Sa	6 07	6 10
78	19	☉	6 06	6 11
79	20	M	6 04	6 12
80	21	Tu	6 02	6 13
81	22	W	6 01	6 14
82	23	Th	5 59	6 15
83	24	F	5 58	6 16
84	25	Sa	5 56	6 17
85	26	☉	5 54	6 18
86	27	M	5 52	6 19
87	28	Tu	5 51	6 20
88	29	W	5 49	6 21
89	30	Th	5 47	6 22
90	31	F	5 45	6 23

Moon's Phases.

Full M., March 2, 11 h. 8 m., morn.
Last Q., March 10, 0 h. 13 m., eve.
New M., March 17, 11 h. 33 m., eve.
First Q., March 24, 4 h. 33 m., eve.

APRIL, 1893.

4th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
91	1	Sa	5 44	6 24
92	2	☉	5 42	6 26
93	3	M	5 41	6 27
94	4	Tu	5 39	6 28
95	5	W	5 37	6 29
96	6	Th	5 36	6 30
97	7	F	5 34	6 31
98	8	Sa	5 33	6 32
99	9	☉	5 31	6 33
100	10	M	5 30	6 34
101	11	Tu	5 28	6 35
102	12	W	5 26	6 36
103	13	Th	5 25	6 37
104	14	F	5 24	6 38
105	15	Sa	5 22	6 39
106	16	☉	5 20	6 40
107	17	M	5 19	6 41
108	18	Tu	5 17	6 42
109	19	W	5 16	6 43
110	20	Th	5 14	6 44
111	21	F	5 13	6 45
112	22	Sa	5 11	6 46
113	23	☉	5 10	6 47
114	24	M	5 08	6 48
115	25	Tu	5 07	6 49
116	26	W	5 06	6 50
117	27	Th	5 04	6 51
118	28	F	5 03	6 52
119	29	Sa	5 02	6 53
120	30	☉	5 00	6 55

Moon's Phases.

Full M., April 1, 2 h. 17 m., morn.
Last Q., April 9, 6 h. 35 m., morn.
New M., April 16, 9 h. 34 m., morn.
First Q., April 23, 0 h. 26 m., morn.
Full M., April 30, 6 h. 28 m., eve.

MAY, 1893.

5th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
121	1	M	4 59	6 56
122	2	Tu	4 58	6 57
123	3	W	4 56	6 58
124	4	Th	4 55	6 59
125	5	F	4 54	7 00
126	6	Sa	4 53	7 01
127	7	S	4 52	7 02
128	8	M	4 51	7 03
129	9	Tu	4 49	7 04
130	10	W	4 48	7 05
131	11	Th	4 47	7 06
132	12	F	4 46	7 07
133	13	Sa	4 45	7 08
134	14	S	4 44	7 09
135	15	M	4 43	7 10
136	16	Tu	4 42	7 11
137	17	W	4 41	7 12
138	18	Th	4 40	7 13
139	19	F	4 39	7 14
140	20	Sa	4 39	7 15
141	21	S	4 38	7 16
142	22	M	4 37	7 17
143	23	Tu	4 36	7 18
144	24	W	4 36	7 19
145	25	Th	4 35	7 20
146	26	F	4 34	7 20
147	27	Sa	4 34	7 21
148	28	S	4 33	7 22
149	29	M	4 32	7 23
150	30	Tu	4 32	7 23
151	31	W	4 31	7 24

Moon's Phases.

Last Q., May 8, 9 h. 24 m., eve.
New M., May 15, 5 h. 46 m., eve.
First Q., May 22, 9 h. 52 m., morn.
Full M., May 30, 10 h. 22 m., morn.

JUNE, 1893.

6th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M
152	1	Th	4 31	7 24
153	2	F	4 30	7 25
154	3	Sa	4 30	7 26
155	4	S	4 30	7 26
156	5	M	4 29	7 27
157	6	Tu	4 29	7 28
158	7	W	4 29	7 28
159	8	Th	4 29	7 29
160	9	F	4 28	7 30
161	10	Sa	4 28	7 30
162	11	S	4 28	7 31
163	12	M	4 28	7 31
164	13	Tu	4 28	7 32
165	14	W	4 28	7 32
166	15	Th	4 28	7 32
167	16	F	4 28	7 33
168	17	Sa	4 28	7 33
169	18	S	4 28	7 33
170	19	M	4 28	7 34
171	20	Tu	4 29	7 34
172	21	W	4 29	7 34
173	22	Th	4 29	7 34
174	23	F	4 29	7 34
175	24	Sa	4 29	7 34
176	25	S	4 30	7 35
177	26	M	4 30	7 35
178	27	Tu	4 30	7 35
179	28	W	4 31	7 35
180	29	Th	4 31	7 35
181	30	F	4 32	7 35

Moon's Phases.

Last Q., June 7, 8 h. 43 m., morn.
New M., June 14, 0 h. 51 m., morn.
First Q., June 20, 9 h. 37 m., eve.
Full M., June 29, 1 h. 25 m., morn.

JULY, 1893.

7th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	Sun sets. H. M.
182	**1**	Sa	4 32	7 35
183	**2**	S	4 32	7 35
184	**3**	M	4 33	7 34
185	**4**	Tu	4 33	7 34
186	**5**	W	4 34	7 34
187	**6**	Th	4 35	7 34
188	**7**	F	4 35	7 33
189	**8**	Sa	4 36	7 33
190	**9**	S	4 37	7 33
191	**10**	M	4 37	7 32
192	**11**	Tu	4 38	7 32
193	**12**	W	4 39	7 31
194	**13**	Th	4 39	7 31
195	**14**	F	4 40	7 30
196	**15**	Sa	4 41	7 30
197	**16**	S	4 42	7 29
198	**17**	M	4 43	7 29
199	**18**	Tu	4 44	7 28
200	**19**	W	4 44	7 27
201	**20**	Th	4 45	7 26
202	**21**	F	4 46	7 26
203	**22**	Sa	4 47	7 25
204	**23**	S	4 48	7 24
205	**24**	M	4 48	7 23
206	**25**	Tu	4 49	7 23
207	**26**	W	4 50	7 22
208	**27**	Th	4 51	7 21
209	**28**	F	4 52	7 20
210	**29**	Sa	4 53	7 19
211	**30**	S	4 54	7 18
212	**31**	M	4 55	7 17

Moon's Phases.

Last Q., July 6, 5 h. 5 m., eve.
New M., July 13, 7 h. 47 m., morn.
First Q., July 20, 0 h. 2 m., eve.
Full M., July 28, 3 h. 10 m., eve.

AUGUST, 1893.

8th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	Sun sets. H. M.
213	**1**	Tu	4 56	7 16
214	**2**	W	4 57	7 14
215	**3**	Th	4 58	7 13
216	**4**	F	4 59	7 12
217	**5**	Sa	5 00	7 11
218	**6**	S	5 01	7 10
219	**7**	M	5 02	7 09
220	**8**	Tu	5 03	7 07
221	**9**	W	5 04	7 06
222	**10**	Th	5 05	7 05
223	**11**	F	5 06	7 04
224	**12**	Sa	5 07	7 02
225	**13**	S	5 08	7 01
226	**14**	M	5 09	7 00
227	**15**	Tu	5 10	6 58
228	**16**	W	5 11	6 57
229	**17**	Th	5 12	6 55
230	**18**	F	5 13	6 54
231	**19**	Sa	5 14	6 53
232	**20**	S	5 15	6 51
233	**21**	M	5 16	6 50
234	**22**	Tu	5 17	6 48
235	**23**	W	5 17	6 47
236	**24**	Th	5 18	6 45
237	**25**	F	5 19	6 44
238	**26**	Sa	5 20	6 42
239	**27**	S	5 21	6 41
240	**28**	M	5 22	6 39
241	**29**	Tu	5 23	6 37
242	**30**	W	5 24	6 36
243	**31**	Th	5 25	6 34

Moon's Phases.

Last Q., Aug. 4, 11 h., 23 m., eve.
New M., Aug. 11, 3 h. 47 m., eve.
First Q., Aug. 19, 4 h. 52 m., morn.
Full M., Aug. 27, 3 h. 43 m., morn.

SEPTEMBER, 1893.

9th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
244	1	F	5 26	6 33
245	2	Sa	5 27	6 31
246	3	S	5 28	6 29
247	4	M	5 29	6 28
248	5	Tu	5 30	6 26
249	6	W	5 31	6 24
250	7	Th	5 32	6 23
251	8	F	5 33	6 21
252	9	Sa	5 34	6 20
253	10	S	5 35	6 18
254	11	M	5 36	6 16
255	12	Tu	5 37	6 15
256	13	W	5 38	6 13
257	14	Th	5 39	6 11
258	15	F	5 40	6 09
259	16	Sa	5 41	6 08
260	17	S	5 42	6 06
261	18	M	5 43	6 04
262	19	Tu	5 44	6 03
263	20	W	5 45	6 01
264	21	Th	5 46	5 59
265	22	F	5 47	5 58
266	23	Sa	5 48	5 56
267	24	S	5 49	5 55
268	25	M	5 50	5 53
269	26	Tu	5 51	5 52
270	27	W	5 52	5 50
271	28	Th	5 53	5 48
272	29	F	5 54	5 46
273	30	Sa	5 54	5 44

Moon's Phases.

Last Q., Sept. 3, 4 h. 41 m., morn.
New M., Sept., 10, 2 h. 5 m., morn.
First Q., Sept. 17, 11 h. 19 m., eve.
Full M., Sept. 25, 3 h. 23 m., eve.

OCTOBER, 1893.

10th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
274	1	S	5 56	5 43
275	2	M	5 57	5 41
276	3	Tu	5 58	5 39
277	4	W	5 59	5 38
278	5	Th	6 00	5 36
279	6	F	6 01	5 35
280	7	Sa	6 02	5 33
281	8	S	6 03	5 31
282	9	M	6 04	5 30
283	10	Tu	6 05	5 28
284	11	W	6 07	5 27
285	12	Th	6 08	5 25
286	13	F	6 09	5 23
287	14	Sa	6 10	5 22
288	15	S	6 11	5 20
289	16	M	6 12	5 19
290	17	Tu	6 13	5 17
291	18	W	6 14	5 16
292	19	Th	6 15	5 14
293	20	F	6 16	5 13
294	21	Sa	6 18	5 12
295	22	S	6 19	5 10
296	23	M	6 20	5 09
297	24	Tu	6 21	5 07
298	25	W	6 22	5 06
299	26	Th	6 23	5 04
300	27	F	6 24	5 03
301	28	Sa	6 26	5 02
302	29	S	6 27	5 01
303	30	M	6 28	4 59
304	31	Tu	6 29	4 58

Moon's Phases.

Last Q., Oct. 2, 10 h. 19 m., morn.
New M., Oct. 9, 3 h. 27 m., eve.
First Q., Oct. 17, 6 h. 20 m., eve.
Full M., Oct. 25, 2 h. 28 m., morn.
Last Q., Oct. 31, 5 h. 42 m., eve.

NOVEMBER, 1893.

11th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
305	1	W	6 30	4 57
306	2	Th	6 31	4 56
307	3	F	6 32	4 54
308	4	Sa	6 34	4 53
309	5	☉	6 35	4 52
310	6	M	6 36	4 51
311	7	Tu	6 37	4 50
312	8	W	6 38	4 49
313	9	Th	6 40	4 48
314	10	F	6 41	4 47
315	11	Sa	6 42	4 46
316	12	☉	6 43	4 45
317	13	M	6 44	4 44
318	14	Tu	6 46	4 43
319	15	W	6 47	4 42
320	16	Th	6 48	4 41
321	17	F	6 49	4 40
322	18	Sa	6 50	4 39
323	19	☉	6 51	4 39
324	20	M	6 53	4 38
325	21	Tu	6 54	4 38
326	22	W	6 55	4 37
327	23	Th	6 56	4 36
328	24	F	6 57	4 36
329	25	Sa	6 58	4 35
330	26	☉	6 59	4 35
331	27	M	7 00	4 35
332	28	Tu	7 02	4 34
333	29	W	7 03	4 34
334	30	Th	7 04	4 34

Moon's Phases.

New M., Nov. 8, 7 h. 57 m., morn.
First Q., Nov. 16, 0 h. 44 m., morn.
Full M., Nov. 23, 1 h. 8 m., eve.
Last Q., Nov. 30, 4 h. 8 m., morn.

DECEMBER, 1893.

12th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
335	1	F	7 05	4 34
336	2	Sa	7 06	4 33
337	3	☉	7 07	4 33
338	4	M	7 08	4 33
339	5	Tu	7 09	4 32
340	6	W	7 10	4 32
341	7	Th	7 11	4 32
342	8	F	7 12	4 32
343	9	Sa	7 13	4 32
344	10	☉	7 14	4 32
345	11	M	7 15	4 32
346	12	Tu	7 15	4 32
347	13	W	7 16	4 33
348	14	Th	7 16	4 33
349	15	F	7 17	4 33
350	16	Sa	7 18	4 33
351	17	☉	7 18	4 33
352	18	M	7 19	4 34
353	19	Tu	7 20	4 34
354	20	W	7 20	4 35
355	21	Th	7 21	4 35
356	22	F	7 21	4 36
357	23	Sa	7 22	4 37
358	24	☉	7 22	4 37
359	25	M	7 23	4 38
360	26	Tu	7 23	4 39
361	27	W	7 23	4 39
362	28	Th	7 23	4 40
363	29	F	7 24	4 40
364	30	Sa	7 24	4 41
365	31	☉	7 24	4 42

Moon's Phases.

New M., Dec. 8, 2 h., 40 m., morn.
First Q., Dec. 16, 5 h. 23 m., morn.
Full M., Dec. 22, 11 h. 36 m., eve.
Last Q., Dec. 29, 6 h. 17 m., eve.

STANDARD TIME.

For the convenience of the traveling public, the railroads of the United States and the Dominion of Canada on the 18th of November, 1883, adopted an arrangement by which 5 time-standards take the place of the 54 previously used in preparing their time-tables.

The standards adopted with names by which they are distinguished, and their distance in longitude and consequent difference in time from Greenwich are shown by the following table.

Name.	Central Meridian	Hours.
Intercolonial	60° West	4 Slower
Eastern	75°	5
Central	90° from	6 than
Mountain	105°	7
Pacific	120° Greenwich.	8 Greenwich.

There are thus formed five "Time Belts," each comprising the area lying within 7½ degrees on each side of the different meridians, and measuring approximately 700 miles in breadth. In each of these time-belts, the standard time is one hour faster than in the adjoining time-belt on the West, and one hour slower than in that adjoining on the East. The boundary lines between the different time-belts are not strictly geographical, being arranged to correspond with important railroad points, as follows:—

Intercolonial Times is practically disregarded, as the country included lies so far to the eastward.

Eastern Time prevails over the whole section east of a line drawn from Buffalo, N. Y., through Pittsburgh, Pa.; Parkersburgh and Huntington, W. Va.; Bristol, Tenn., and Augusta, Ga., changing at these places (except Grand Trunk, of Canada, which changes at Sarnia) to

Central Time which extends to the irregular line drawn from Brandon, Man., through Mandan, Dak.; North Platte, Neb.; Dodge City, Kan., to El Paso, New Mexico. West of this line,

Mountain Time is in use, and covers the district up to another line, which, starting from Heron, Mont., passes through Ogden, Utah, to Yuma, Ariz.

Pacific Time is used from this line to the Pacific Ocean.

The Standards adopted by the Railroads have also been very generally adopted by the cities and towns throughout the country in place of the local time; from which it may differ by nearly thirty minutes fast or slow, according as the locality is east or west of the standard meridian. The exact *plus* or *minus* correction to be applied in changing from local to standard time or *vice versa* may be easily calculated in the following manner:—Reduce the longitude of the given locality to time (by multiplying the degrees, minutes and seconds by 4, which gives hours, minutes and seconds) and subtract the longitude of the given meridian from it. For example, the longitude of Boston is 71° 4′ = 4h. 44m. Subtracting the longitude of the Eastern Standard Meridian 75° = 5h. from this, gives a *minus* result of 3° 56′ or 15m. 44sec. (say 16m.), as the difference by which Boston local meantime is faster than the Eastern Standard. In a similar manner, the local time of a place 3° 56′ West of the meridian, that is, long. 78° 56′ west, would be 15m. 44 sec. slow.

The following table gives the correction for a number of the principal cities of the continent.

Standard Time Table.

Correction to be applied to local mean time to obtain standard time.

	Standard	Correction.		Standard	Correction.		Standard	Correction.
		m.			m.			m.
Eastport, Me.	Intercol.	+28	Columbia, S. C.	Eastern.	+24	Memphis, Tenn.	Central.	——
Portland, Me.	Eastern.	—19	Columbus, O.	Central.	—28	Mobile, Ala.	"	— 8
Montpelier, Vt.	"	—10	Detroit, Mich.	"	—28	New Orleans, La.	"	——
Boston, Mass.	"	—16	Indianapolis, Ind.	"	—16	Austin, Tex.	"	+31
Springfield, Mass.	"	—10	Chicago, Ill.	"	—10	Cheyenne, Wyo.	Mount'n.	— 1
Providence, R.I.	"	—14	Springfield, Ill.	"	— 2	Denver, Col.	"	——
Hartford, Conn.	"	— 9	Galena, Ill.	"	+ 2	Santa Fé, N. Mex	"	+ 4
Albany, N. Y.	"	— 5	Milwaukee, Wis.	"	— 8	Helena, Montana	"	—28
New York, N. Y.	"	— 4	St. Paul, Minn.	"	+12	Virginia City, N.	Pacific.	— 2
Utica, N. Y.	"	+ 1	St. Louis, Mo.	"	+ 1	San Francisco, C.	"	+10
Rochester, N. Y.	"	+11	Lawrence, Kan.	"	+21	Portland Ore.	"	+11
Philadelphia, Pa.	"	+ 1	Omaha, Neb.	"	+24	Quebec, Quebec.	Eastern.	—15
Harrisburg, Pa.	"	+ 7	Bismark, Dakota.	"	+43	Montreal, Quebec	"	— 6
Pittsburg, Pa.	"	+20	Savannah, Ga.	"	—36	Ottawa, Ont.	"	+ 3
Baltimore, Md.	"	+ 6	Milledgeville. Ga	"	—27	Toronto, Ont.	"	+18
Washington, D.C	"	+ 8	Jacksonville, Fla.	"	—33			
Wheeling, W.Va.	"	+23	Louisville, Ky.	"	—18			

DIFFERENCE IN TIME (For Cable Purposes),

BETWEEN NEW YORK AND SOME OF THE PRINCIPAL COMMERCIAL CITIES OF THE WORLD.
This Table is Approximate; the odd seconds are not given.

	H.M.		H.M.		H.M.		H.M.
Aden	7 56 F	Brussels	5.14 F	Gibraltar	4.35 F	Moscow	7.25 F
Alexandria	6.56 F	Buenos Ayres	1.02 F	Greenwich	4.56 F	Panama	.12 S
Algiers	5.08 F	Cadiz	4.27 F	Hamburg	5.36 F	Paris	5.02 F
Amsterdam	5.16 F	Calcutta	10.50 F	Havana	.33 S	Rio de Janeiro	2.03 F
Antwerp	5.13 F	Canton	11.31 S	Hong Kong	11.27 S	Rome	5.46 F
Athens	6.31 F	Cape Town	6.10 F	Lisbon	4.19 F	St. Petersburg	6 57 F
Bahia	2.34 F	Christiania	5.39 F	Liverpool	4.44 F	Stockholm	6.08 F
Berlin	5.50 F	Constantinople	6.53 F	London	4.56 F	Sidney	9.59 F
Berne	5.26 F	Copenhagen	5.46 F	Madrid	4.42 F	Valparaiso	.10 F
Bombay	9.48 F	Dublin	4.31 F	Melbourne	9.14 F	Vera Cruz	1.29 S
Bordeaux	4.53 F	Edinburgh	4.43 F	Mexico City	1.40 S	Vienna	6.01 F
Bremen	5.31 F	Geneva	5.21 F	Montevideo	1.11 F	Yokohama	10.45 S

F—*Fast of N. Y. Time.* S—*Slow of N. Y. Time.*

The Difference in time is calculated on actual New York Mean Time, 74° of longitude west of Greenwich. For the new Standard Time, 75th Meridian west of Greenwich, for places west of New York, subtract 4 minutes; for places east of New York, add 4 minutes.

LEGAL HOLIDAYS IN THE VARIOUS STATES.

JANUARY 1. NEW YEAR'S DAY: In Alabama, Arkansas, California, Colorado, Connecticut, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Michigan, Missouri, Nevada, New Jersey, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, West Virginia, Wisconsin, and Wyoming.

JANUARY 8. ANNIVERSARY OF THE BATTLE OF NEW ORLEANS: In Louisiana.

* FEBRUARY 22. WASHINGTON'S BIRTHDAY: In Alabama, California, Colorado, Connecticut, Georgia, Idaho, Illinois, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Utah, Virginia, Wisconsin, and Wyoming.

FEBRUARY 14. MARDI GRAS: In Louisiana.

MARCH 2. ANNIVERSARY OF TEXAN INDEPENDENCE: In Texas.

MARCH 4. FIREMEN'S ANNIVERSARY: In New Orleans, La.

MARCH 31, 1893. GOOD FRIDAY: In Louisiana, Maryland, and Pennsylvania.

APRIL 21. ANNIVERSARY OF THE BATTLE OF SAN JACINTO: In Texas.

* APRIL 26. MEMORIAL DAY: In Georgia.

MAY 30. DECORATION DAY: In California, Colorado, Connecticut, Iowa, Illinois, Kansas, Kentucky, Massachusetts, Michigan, Nevada, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Wisconsin, and Wyoming.

JULY 4. INDEPENDENCE DAY: In all the States except Nebraska.

SEPTEMBER 4, 1893. LABOR DAY: In Colorado, Connecticut, Illinois, Iowa, Kansas, Maine, Massachusetts, Montana, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, and Tennessee.

NOVEMBER 7, 1893. GENERAL ELECTION DAY: In California, Kansas, Maryland, Missouri, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, South Carolina, South Dakota, and Wisconsin.

NOVEMBER 30, 1893. THANKSGIVING: Is observed in all the States, though in Nebraska and some others it is not a statutory holiday.

DECEMBER 25. CHRISTMAS DAY: In all the States except Nebraska.

Sundays and Fast Days (whenever appointed) are legal holidays in nearly all the States.

ARBOR DAY is a legal holiday in Idaho and Kansas, the day being set by the Governor. Arbor Day is also a legal holiday in Rhode Island, but does not affect the payment of notes, etc.

In Minnesota, Washington's Birthday is the only general holiday expressly provided by law. As to the maturity of bills and notes, the following days are by implication holidays: Thanksgiving Day, Good Friday, Christmas, January 1st, and July 4th; as to schools—Christmas, January 1st, July 4th, Memorial Day, and Thanksgiving Day.

In Nebraska, there are no legal holidays established by statute. The same is the case in New Mexico,

Every Saturday after 12 o'clock noon is a legal holiday in New York.

* *NOTE.*—Holidays falling on Sunday are usually kept on the Monday following.

WEATHER INDICATIONS.

Sunset Colors.—A gray, lowering sunset, or one where the sky is green, or yellowish green, indicates rain. A red sunrise, with clouds lowering later in the morning, also indicates rain.

Halo (Sun Dogs).—By halo we mean the large circles, or parts of circles, about the sun or moon. A halo occurring after fine weather indicates a storm.

Corona.—By this term we mean the small colored circles frequently seen around the sun or moon. A corona growing smaller indicates rain; growing larger, fair weather.

Rainbows.—A morning rainbow is regarded as a sign of rain; an evening rainbow, of fair weather.

Sky Color.—A deep blue color of the sky, even when seen through clouds, indicates fair weather; a growing whiteness, an approaching storm.

Fog.—Fogs indicate settled weather. A morning fog usually breaks away before noon.

Visibility.—Unusual clearness of the atmosphere, unusual brightness or twinkling of the stars, indicates rain.

Clouds.—In observing clouds, we observe their kinds, motions, and outlines. The clouds frequently called ' mare's tales " we term Cirri. They are marked by their light texture, fibrous and sundered as in the "mare's tail," or interlacing, as in the far-spreading white cloud, which produces the halo. Small, regularly formed groups of these clouds are frequently seen in fair and settled weather. The Cirri are also the clouds on the forepart of the storm. In this case they are usually more abundant, their outline is very ragged, and they gradually blend into a white, far-reaching cloud bank. The cloud well known as "cotton bales," or "thunder heads," we term cumulus. When they appear during the heat of the day and pass away in the evening, continued fair weather may be expected. When they increase with rapidity, sink into the lower part of the atmosphere, and remain as the evening approaches, rain is at hand. If loose patches appear thrown out from their surfaces, showers may be expected. The clouds usually seen after nightfall, lying in one horizontal plane, and not of great extent, are attendant on fine weather. Small, black, inky clouds and dark scud indicate rain.

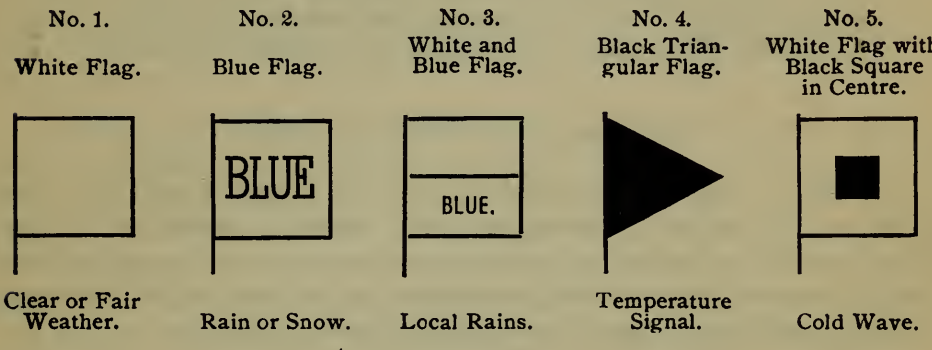
Frost.—The first frost and last frost are usually preceded by a temperature very much above the mean.

EXPLANATION OF THE FLAG AND WHISTLE SIGNALS

ADOPTED BY THE UNITED STATES WEATHER BUREAU.

1. The Weather Bureau furnishes, when practicable, for the benefit of the general public and those interests dependent to a greater or less extent upon weather conditions, the "Forecasts" which are prepared at this office daily, at 10 A.M. and 10 P.M., for the following day. These weather forecasts are telegraphed to observers at stations of the Weather Bureau, railway officials, and many others, and are so worded as to be readily communicated to the public by means of flags or steam whistles. The flags adopted for this purpose are five in number, and of the form and dimensions indicated below:

EXPLANATION OF FLAG SIGNALS.



Number 1, white flag, six feet square, indicates clear or fair weather. Number 2, blue flag, six feet square, indicates rain or snow. Number 3, white and blue flag (parallel bars of white and blue), six feet square, indicates that local rains or showers will occur, and that the rainfall will not be general. Number 4, black triangular flag, four feet at the base and six feet in length, always refers to temperature; when placed above numbers 1, 2, or 3 it indicates warmer weather; when placed below numbers 1, 2, or 3 it indicates colder weather; when not displayed, the indications are that the temperature will remain stationary, or that the change in temperature will not vary more than four degrees from the temperature of the same hour of the preceding day from March to October, inclusive, and not more than six degrees for the remaining months of the year. Number 5, white flag, six feet square, with black square in centre, indicates the approach of a *sudden* and *decided* fall in temperature. This signal is not to be displayed unless it is expected that the temperature will fall to 42 degrees, or lower, and is usually ordered at least twenty-four

hours in advance of the cold wave. When number 5 is displayed, number 4 is always omitted.

2. When displayed on poles the signals should be arranged to read downward; when displayed from horizontal supports a small streamer should be attached to indicate the points from which the signals are to be read.

Interpretation of Displays.

No. 1, alone, indicates fair weather, stationary temperature.
No. 2, alone, indicates rain or snow, stationary temperature.
No. 3, alone, indicates local rain, stationary temperature.
No. 1, with No. 4 above it, indicates fair weather, warmer.
No. 1, with No. 4 below it, indicates fair weather, colder.
No. 2, with No. 4 above it, indicates warmer weather, rain or snow.
No. 2, with No. 4 below it, indicates colder weather, rain or snow.
No. 3, with No. 4 above it, indicates warmer weather with local rains.
No. 3, with No. 4 below it, indicates colder weather with local rains.
No. 1, with No. 5 above it, indicates fair weather, cold wave.
No. 2, with No. 5 above it, indicates wet weather, cold wave.

Explanation of Whistle Signals.

3. Note.—The warning signal, to attract attention, will be a long blast of from fifteen to twenty seconds' duration. After this warning signal has been sounded, long blasts (of from four to six seconds' duration) refer to weather, and short blasts (of from one to three seconds' duration) refer to temperature; those for weather will be sounded first.

Blasts.	Indicate.
One long	Fair weather.
Two long	Rain or snow.
Three long	Local rains.
One short	Lower temperature.
Two short	Higher temperature.
Three short	Cold wave.

Interpretation of Combination Blasts.

One long, alone	Fair weather, stationary temperature.
Two long, alone	Rain or snow, stationary temperature.
One long and one short	Fair weather, lower temperature.
Two long and two short	Rain or snow, higher temperature.
One long and three short	Fair weather, cold wave.
Three long and two short	Local rains, higher temperature.

(By repeating each combination a few times, with an interval of ten seconds between, possibilities of error in reading the forecasts will be avoided, such as may arise from variable winds, or failure to hear the warning signal.)

4. As the weather forecasts are telegraphed daily to a large number of stations of the Weather Bureau, to railroads, etc., in various sections of the country, there are many small towns which may obtain them by telephone, free of expense; they may also be obtained from the Associated Press dispatches published in daily newspapers. Those desiring to display or sound the signals, and who are not able to obtain the forecasts as above, should communicate direct with the Director of the State Weather Service, or with this office, when, if practicable, the predictions will be telegraphed to them the at expense of the Weather Bureau; and if it is impracticable for the United States to bear the expense of transmission, they will be furnished at the regular commercial rates and sent "collect."

5. In no case will both A.M. and P.M. forecasts be sent to the same address at Government expense; nor will the telegrams be sent to more than one person, or firm, in any one place, except at the expense of the applicant.

6. Flag weather signals are displayed at many stations throughout the United States, and this improved system has been adopted with the view of securing uniformity, and is recommended after a careful test. The method is not complicated; the solid colors insure legibility, and the flags may be obtained at small expense, or, if desired, material may be procured, and the symbols be of home manufacture, no restriction being placed upon the size of the flags used, so long as they conform to the system above outlined, but no flags should be less than six feet square.

7. The system of whistle signals may be utilized to better advantage in many places where flags could not be seen at long distances, due notification having been given to the surrounding community through the press and otherwise that, at a designated hour, the steam whistle at a certain place will sound the signal to indicate the probable weather and temperature for the ensuing twenty-four hours.

8. The flag displays here outlined may be greatly extended and become one of the most valuable aids to farmers, shippers, and the public generally, by a little exertion and a small outlay for flags on the part of those who would be benefited. The system has been adopted and is in use by some of the principal railroads throughout the country, the symbols, made of tin or sheet iron, being displayed from the baggage cars. These roads transmit over their wires each morning, to points from which trains start, the names of the symbols to be displayed, the baggage-master at those points attaching them. When the symbols are displayed on the cars they

should be placed one above the other and read downward. Many large firms and corporations are exhibiting the flags, and at the same time advertising their business by printing the signals and their meanings on the back of their business cards.

9. There being but a limited appropriation at the disposition of the Chief of the Weather Bureau for the purchase of flags, it is necessary that the utmost care be used in their distribution in order that they may be placed in proper hands where they will be properly cared for as Government property and only used for the purpose for which they are intended. In many instances individuals, or firms, receiving the forecasts at Government expense manufacture or procure their own signals for such displays; those desiring to take such action in their individual cases may purchase the flags from any of the following firms at various prices, dependent upon the quality of the material used in their construction.

WASHINGTON, D. C., August 1, 1891.





G. WATMOUGH WEBSTER, PHOTO. F. GUTEKUNST PRINT.

"GOOD MORNING!"

The American Annual of Photography
and Photographic Times Almanac.
1893

NEW FORMULAS FOR ENLARGEMENTS.

THE exact adjustment of the scale of enlargement may be made in two ways; by varying the distance of the original and correspondingly varying the position of the plate or by exchanging the lens for one of a different focus. Putting in a lens of shorter focus may bring forward the plate inconveniently, or so much as to unduly enlarge the angle required. But a long focus spectacle lens, convex or concave, may be placed over the lens, which will vary the focus to any required extent, without injuring the definition with a small stop. I have reduced the formulas to an extremely simple form:

Let d = distance of the original from the lens.
" r = focal length of the lens.
" f = focal distance of the plate from the lens.
" R = focal length of the added lens, concave if negative.
" M = magnifying or enlarging power.
" P = proportionate power of combination.
" M' = MP = enlarging power, with added lens.
Then if f is unchanged when R is added, we have the formulas:

$$M = \frac{f}{d} = \frac{f - r}{r}$$

$$R = \frac{d}{P - 1} = \frac{f}{M' - M}$$

To illustrate: Suppose we have $r = 8$ inches; $f = 24$ inches, the extent of the draw; $d = 12$ inches; $M = 2$. We wish an enlargement one-fourth more, making $P - 1 = 1\text{-}4$; $M' = 2\ 1\text{-}2$.

If we exchange the lens for one of 4 inches focus, f remaining unchanged, $M = 5$, by the last formula. Diminishing f to reduce M to one-half, may so increase the angle as not to cover the plate. But we may use an added lens with either.

First, using $r = 8$, R becomes, by the first formula, $4d$, or 48 inches, convex. Or, computing by the other formula, $M'—M = 1\text{-}2$, and $R = 2f = 48$ inches, as before.

Or if we wish to use $r = 4$, P will be 1-2, and $P—1 = —1\text{-}2$ whence $R = —2d$; concave. We can obtain d by trial, or by inverting the first formula for M above; but it will be more simple to use the second formula for R; M being 5, $M'—M = —2\ 1\text{-}2$; and dividing $f = 24$ by—2 1-2, we have the reresult, $R = —9.6$ inches; concave. A 12-inch concave lens will answer the purpose, reducing f on adjustment only 3 inches.

In selecting between shortening the focus with a convex lens, and lengthening the too short focus with a concave lens, it will usually be best to adopt the method requiring the least powerful added lens.

These formulas are based upon an assumed identity of position in the two lenses; so that the error from the actual distance between the two lenses may become perceptible. Or the focal length of the lenses may not be exactly known. There will generally be a slight remaining adjustment to be made in the usual way by varying f.

The same formulas apply to reductions, in which case M is fractional.

The same device of an added lens may be used in taking views, when the camera extension is sufficient. In this case we have the formula:

$$R = \frac{Pr}{1 - P}$$

If P is more than 1, the added lens will be concave, and the picture will be enlarged. If P is less than 1, the added lenses will be convex, and the picture will be diminished. $f = Pr$. That is, the size of a given object, from a certain position, is in proportion to the focal length of the lens or combination used.

Henry M. Parkhurst.

PHOTOGRAPHIC ECONOMY.

A PROPRIETOR of a photographic printing establishment which turns out over two millions of prints within two months at an exceedingly low price, told me that a large part of his profits are obtained from the saving of waste! Strange as this may seem it is, nevertheless, true, that enormous amounts of silver and gold can be saved by careful management; and, when a large business is done, this saving of waste amounts to a great deal.

When we consider that of the 100 parts of silver employed but from 3 to 7 parts constitute the photographic image, whether it be on glass, paper, or any other substance, positive or negative; and that the other 97 or more parts vanish from view, it is quite natural to inquire what has become of it. Matter being indestructible, the silver apparently gone, is still somewhere in some form of chemical combination, and the economical photographer will make it his task to find it and recover it.

With the various chemical and photographic operations required to produce a picture some silver is lost unavoidably, and the recovery of the total 97 or more per cent. is out of the question. When the accumulated wastes of different descriptions finally yield from 65 to 72 per cent., we should be satisfied. Of course this recovered silver can be but the metal itself, and it is presupposed the amount of metallic silver contained in the nitrate employed, must be previously calculated to give us correct returns.

Freshly silvered albumen or plain paper is rich in silver which does not come into actual use. Much of the nitrate solution adheres to the paper mechanically, but does not combine with the chloride used for salting the paper preparatory to sensitizing it.

This is the most valuable source of silver we find, and the several wash-waters used to remove it previous to toning, should be collected, saved and precipitated, as later on will be shown.

Ready-sensitized albumen paper, from which the free nitrate has been partially removed, does not yield as much silver of course.

Professional photographers trim pictures to the required size before toning, they save all clippings, prints either too dark or too light, filters, blotters, wiping-cloth, in fact every bit of paper that has come in contact with silver. This

kind of waste is reduced to ashes in peculiarly constructed wind ovens, and the silver reduced to the metallic state in the crucible. The burning of large amounts of paper waste is a tedious operation, involving invariably much loss of material, and we think it more profitable in the end, to establish a tub containing hyposulphite of sodium solution, for the fixing of these wastes, and to precipitate the silver from them, afterwards.

The fixing-baths for positive and negative photographs contain much silver; they, with the hypo used for fixing clippings, should be collected in a common receptacle. Waste of emulsions, the rinsings of bottles containing them, light-struck plates are best subjected to the hypo bath, and the results added to the other hypo solutions.

With wet collodion plates the developer does not only reduce the silver haloid, but also the free nitrate of silver adhering; an old developer is rich in silver. From wasted plates scrape the collodion film, also a great source of profit.

Wash-waters containing free nitrate of silver are best precipitated with hydrochloric acid, the chloride of silver formed washed, collected upon a filter, dried, and finally reduced to the metallic state in the crucible. To precipitate these solutions by means of alkaline chlorides is not advisable, as to a certain degree they dissolve chloride of silver, complicate the process, and finally cause a great loss of metal.

All hypo fixing-baths should be precipitated with sulphide of potassium, the hepar-sulphuris of commerce. The precipitate of sulphide of silver is very heavy, sinks readily to the bottom of the vehicle, and permits a speedy removal of the supernatant clear liquid, so as to allow a continuous collecting and repeated precipitation of the solutions containing silver. The precipitate is collected upon a filter, dried, and, on account of sulphur present, roasted, before reducing it in the melting-pot.

Combined fixing and toning baths containing sulphocyanates should be first mixed with sulphuric acid before a precipitation can take place, and cyanide of potassium fixers, as used for collodion plates, be precipitated with ammonium hydrosulphate. The results may be added to those consisting of sulphide of silver.

To recover silver from fixed gelatine and collodion plates is not profitable, excepting when the glass plate freed from the film is the object in view. The cost of removing the gelatine film, destroying the adhesive property of the carrier, and the

collecting of the small amount of silver present, actually exceed the value of the precious metal. The same holds good with fixed and toned paper prints, excepting perhaps that the amount of gold of the print is of consideration. Gold surely does not exist there in paying quantities; but there is a case on record of an old German refiner of photographic waste who recovered from several hundred pounds of fixed and toned prints gold enough to have it wrought into wedding-rings for his daughter and expected son-in-law.

Every print toned in the alkaline gold bath holds a certain amount of gold solution and carries it to the fixing-bath. These small amounts of gold are recoverable by metallurgic processes, and reliable refiners always return the amounts of gold found in the silver wastes from fixed and toned prints.

The recovery of gold from alkaline toning-baths is quite an easy matter, and may be well done in an amateur laboratory. When a sufficient amount of old gold-bath has been collected, acidify with hydrochloric acid, heat to about 150 deg. F., and add a concentrated solution of ferrous sulphate as long as a brown precipitate is thrown down, then settle, wash repeatedly in very weak diluted hydrochloric acid (about 10 per cent.), to remove all iron possibly present and finally in pure water. The resulting brown powder is chemically pure metallic gold, and may be at once dissolved in aqua regia for further use.

The amount of gold recovered is proportionately not as large as that of silver, but is quite considerable nevertheless. From the savings of gold baths of several years' use I at one time realized the handsome little sum of $88, quite enough to encourage gold recovery.

After the photographer has reduced his precipitates of chloride and of sulphide of silver to a perfectly dry state his labors should cease, and the precipitates be entrusted to a professional refiner. His charges for melting silver are low, not more than from 12½ per cent. to 15 per cent. on the whole amount of silver recovered, an expense very far below that incurred when a photographer attempts to do the work himself.

Charles Ehrmann.

PHOTOGRAPHING DISASTERS.

A PRETTY fair pun might be made with the words overhead. The disasters of practical photographing would raise a laugh quite worthy of the pun oftentimes. To any one not individually concerned in the matter, the wreck of the costly photographic outfit, consequent upon a sudden upset, for instance, is a subject for laughter. Not so to the owner, however.

But this is not at all what I mean by photographing disasters. Things comical in photography happen every day, but I wish to say a word or two about the *photographing of disasters*, which will supply an interest of just the opposite sort, namely, a tragic one.

The great resources of modern photography render the pictorial transcription of such scenes as railway accidents, marine collisions and wrecks, collapsed bridges and buildings, the dire effects of floods, cyclones and fires an easy matter, comparatively. But I shall not be accused of speaking a platitude if I ask the readers of the ANNUAL to remember that there must be something left by the disaster to be photographed. Or, in other words, that at times the destruction is so great that there is little or nothing there. The photographs taken at Johnstown, Pa., after the flood, are anything but interesting when the camera was directed to the heaps of miscellaneous *débris* in and near the rivers. Everything being literally ground into fragments, the pictures show nothing. But it is very different when we see the pictures of houses pierced by tall trees and streets filled with wreckage as high as the third-story windows. These subjects made capital photographs and were well worth taking.

In like manner, the pictorial capabilities of railway accidents vary very greatly. I myself was present in one just bad enough to leave an exceedingly picturesque heap of ruined rolling-stock. The photographic attempts made upon it did not do it justice. The professional photographer erred in exposing his plates just at noon and pointing the camera due south, so that the shadows of the picture were black and showed none of the terrible details of the telescoped cars and wrecked engine. An amateur present on the train at the time of the accident did worse yet, by walking off to a distance and posing his camera on the shoulder of one of his friends while making the exposure. He did not get anything at all.

I hope with all my heart that none of the readers of THE ANNUAL will ever be present in such a catastrophe as the one



Friedrich Müller, Munich, Photo.

The Gill Engraving Co., Engrs., New York.

A PORTRAIT STUDY.

I speak of, but it will do no harm for me to suggest that if an opportunity of the kind offers for photographing they should use a wide-angle lens and go close up to the wreck. Selecting a prominent portion that is well lighted, the camera ought to be brought near, and as much of the subject as possible included; but if the sun shines directly against the camera (as I mentioned before) it will be time and labor wasted to expose plates. I shall always regret not having had my outfit with me upon that occasion.

Photography of burning buildings at night (which is not impossible) is never so satisfactory as a good view of the ruins by daylight. In winter in the streets of large cities and towns where abundance of water has been played upon the burning buildings, the pictures will be very pretty and show the ice-effects finely. Views of this kind are best made from an elevated standpoint, which, besides making things easier for the lens, keeps the operator clear of the crowds below.

It is becoming more and more common to photograph such things as these. An accurate photograph of an exploded boiler will be useful to experts investigating the matter. I say an *accurate* photograph. Now, to bring the camera close up and use a wide-angle lens as I suggested for the railroad wreck, would falsify the picture of the boiler so as to make it useless. The only proper way to deal with such a subject as this is to use a stereoscopic camera, with the lenses not too widely separated. Those who have worked with the stereoscopic or twin-lens camera, are aware that by increasing the distance between the centres of the two lenses, the effect of relief or solidity in the picture may be increased at will. They also know that the nearer an object is to the camera, the less the interval separating the lenses should be and *vice versa*. Now, supposing the operator was requested to go right into the exploded boiler and make a view of the interior, the stereoscopic camera with lenses near together would give him excellent perspective, and the picture when seen in the stereoscope would be very true to the original, no matter how confused it might appear to the unassisted eye. Now, on the other hand, if a series of views had to be made of some great upheaval of nature (let us say a volcano eruption) where the work presented more of the landscape character, the stereoscopic apparatus just described would be useless, excepting for here and there a close subject. Large single plates with long-focus lenses, giving a large image, would be the proper thing.

Not to extend this list of "most disastrous chances" too far,

let me say, in concluding, there is great excitement, and pleasurable excitement at that, to be found in this kind of work with the camera, which often from its very nature assumes an *extempore* character. The best wish I can offer my readers is never to be present at a catastrophe either without or with the camera. But to those who may be, I can say keep cool, don't get over-excited, and work as deliberately as possible.

Ellerslie Wallace.

A NEW LIGHT SOURCE OF ENORMOUS POWER.

The active rays utilized in photographic operations are but a very small portion of the light radiating from its many sources. The want of sensitiveness of the photographic plates, the impermeability of the optical media which interpose themselves between the object and the sensitive surface, prevent other rays from becoming active. Were photographers capable of utilizing all the ultra-violet rays, the present times of exposure would be considerably reduced. The greatest obstacle to its use is the glass of which the lenses are made, for it absorbs the principal portion of the ultra-violet light, a disadvantage very severely felt in practical, but much more so in scientific photography.

Of all the branches of science aided by photography, none is so much affected by light absorption as spectrum analysis, and, if instead of glass, other and more appropriate optical media were not at our command, the whole region of the ultra-violet would still be closed to our investigations.

Of dioptric media, to which alone I will confine myself, the light permeability of glass is surpassed in the following order by calcium spar, quartz, and fluor spar; the latter, however, in its white variety only.

For photographing the extreme ultra-violet rays discovered by me,* calcium spar and quartz are of no service, but fluor spar answers excellently well. When light is resolved into its primary rays by means of fluor spar prisms or lenses, one observes that the energy of all the sun rays, or those emanating from electric discharges, is much greater than is demonstrated by photographic operations. But when the sensitive photo surface is that of ordinary plates, even fluor spar fails to bring into action other rays than those whose shortest wave-length does not exceed 180° $\mu\mu$ and as my own observa-

* See further on.

tions have fully proved, these rays are not by any means the most refrangible, as it is generally thought to be the case by previous photographic and ocular experiments.

The cause of this great discrepancy, so fatal to the pursuit of spectrum analysis, is, in the first place, our entirely erroneous conception of the absorbing power of atmospheric air, and, furthermore, our errors of calculations.

These facts were first established by me. As early as 1890 I noticed that without any other or special aid, the spectrum band enlarged much more towards the most refrangible end when the stratum of air in the spectrograph was exhausted to a minimum, showing evidently that the obstacle from the air was much greater than heretofore acknowledged, and being fully convinced of the fact, I subsequently photographed the spectrum in vacuo. The total elimination of air from the ray path of my spectrograph led me to observe astonishing results far exceeding my expectations. When by means of the air-pump the absorptive influence of the atmosphere has been entirely nullified, large masses of photographically active light begin to arise. The effects obtained with those new rays were indeed surprising, but subsequent experiments still gave more favorable results than the first.

Very extensive and detailed absorption experiments, made with the components of the modern photographic plates, have established the total unfitness of these plates for photographing the spectrum regions beyond the limits established at that time, and this because of their insufficient sensitiveness. These observations naturally led to experiment in order to obtain entirely new color-sensitive plates capable of being impressed by the ultra-violet rays of those regions, heretofore believed to be deprived of all luminous rays. My methods of investigating with these new plates the rays of the shortest wave-length, those of the most remote ultra-violet region, have led me to experiment in new and different directions, which at the same time opens a very promising prospect for the advancement of our knowledge on the nature of the molecule.

Since I first became aware of the enormous richness of the luminous rays, I have been trying to explain the somewhat intricate results first obtained, and to advance still further within the dark province, and the efficacy of my new auxiliaries has been brilliantly confirmed thereby.

I have seen the spectrum grow little by little in the direction of the ultra-violet, and to such an enormous extent, that the last lines I can now photograph are about four

times the distance of the former ultra-violet limit, or as the line of the wave-length 185,2 is distant from the blue-green line of the visible spectrum.

It should not be imagined that these lines which show such an activity of the ether in those unlimited regions are single, or scattered, on the contrary they are far more numerous than the lines in any other region of the spectrum. The greatest number of my experiments refer to the hydrogen light of the Geissler tube, the advantages of which are far superior to any other light in the investigation of the shortest wave-length of the ultra-violet rays. In every one of all my photographs of the hydrogen spectrum about 600 lines will be found united into fourteen remarkable groups.

Long exposures lead to the supposition that there are other lines, and when their action on the sensitive film will be appropriately promoted their number will doubtless increase materially.

As new ultra-violet regions are constantly discovered it is quite natural to ask: "Where is the limit of the ultra-violet light?" To answer now this question is certainly impossible, and this on account of the insufficiency of our means of photographing up to this limit, and even with the latest photographs I have made, the luminous action has been found, with much regret, to possess very little power. Among the several brands of commercial plates used only one was of sufficient sensitiveness, the rest of them being quite indifferent to the spectrum limit, and thus it becomes apparent that I have at least approached the region of the spectrum, where for a complete examination of those adjacent, which heretofore were quite inactive; entirely new expedients will be required.

The ultimate result of all these attempts to discover the shortest wave of light seems almost to recede further and further, the more we advance in the investigations of these dark regions—a supposition justifiable perhaps when photographing with a prism; in reality, however, the fact is quite of a different nature. The more refrangible the light region of the prismatic spectrum, the greater is proportionately its elongation, and the further we advance in the ultra-violet the greater in proportion will be the distance between individual lines; for this reason it can hardly be expected to reach the extreme limit of the ultra-violet region by prismatic means.

Theoretically, the explanation of this problem should be sought by the diffraction-grating. But it is impossible to predict with any degree of certainty whether or not any practical

results will confirm our expectation. The behavior of the grating with very short wave-length is not sufficiently known at present. If when examining the light rays any one is held back, totally or partially, the diffraction-grating can never assist in finding the limits of the remotest ultra-violet rays.

I will now say a few words about my new plates. The photo-chemical experimental researches necessary to obtain the greatest perfection have not been concluded, hence, as I do not wish to present incomplete results to the public, I abstain from giving detailed information as to the method of preparation, and will simply make some remarks on their general behavior, which may be interesting to practical or professional men.

These new plates, as may be inferred from what has been previously said, are exceedingly sensitive to the rays of shorter wave-length than 180,0, but when compared to the bromide of silver gelatine emulsion plates they are but little sensitive to the visible spectrum and the regions contiguous to the ultra-violet. This apparent insensitiveness is, however, advantageous for photographing the most refrangible rays, those of ultra-violet; the action of the diffused light in the interior of the spectroscope, consisting mainly of rays of the visible spectrum sufficient to make a gelatine plate quite unfit to photograph the wave-length of 180,0, is thereby entirely suppressed. Moreover, these plates yield pictures of extreme sharpness and great intensity, they are not acted on by atmospheric influences, keep remarkably well, and by time gain in sensitiveness without being liable, as the gelatine plates are, to produce stains or fogs. A few seconds' immersion suffices to fix them, one minute washing eliminates the fixing agent, and they also dry in a very short period, the whole manipulation requiring but three or four minutes, advantages especially noticeable in microscopic examinations and when one is working alternately with the new and the old slowly drying gelatine plates. These plates behave in a peculiar manner with different developing agents, and when prepared in a certain manner, they have a great tendency to solarize.

These observations are not yet reliable enough to present them in concise form before the public, but I confidently hope to be able to give detailed reports on this subject in the next volume of The American Annual of Photography.

Victor Schumann.

NEW HELIOGRAVURE PROCESS BY MEANS OF ALBUMEN AND BITUMEN.

It has often been tried to replace in the heliographic engraving process bitumen of Judea dissolved in benzine by bichromated gum and albumen; but if these substances are rapidly impressed they do not as well resist the action of the acid employed for etching in relief, and if one succeeds in the first biting in on a reserve of bichromated albumen, a great difficulty is experienced in making the first inking, which is of course necessary in order to continue the etching.

In 1881, Stroubinsky proposed the following process: A copper plate prepared with bichromated gum is coated, immediately after the insolation, with a thin layer of bitumen dissolved in benzine, then immersed in water to effect the development of the image. But notwithstanding a long immersion (from five to ten hours) and rubbing with a brush, seldom a perfect development could be made, the water always refusing to penetrate through the continuous coating of the bitumen varnish.

I have, however, by some modifications to the process, succeeded in rendering it practical, and the principal improvement consists in this, that instead of employing a bitumen varnish forming a continuous layer, I use a bitumen varnish yielding a porous coating. And the coatings prepared as I am going to explain resist quite perfectly the action of the diluted nitric acid employed for biting in on zinc, and also that of the perchloride of iron at 45 deg. B. employed for copper.

I operate in the following manner:

A zinc or copper plate is coated by means of the *tournette* with a thin layer of bichromated albumen prepared thus:

Albumen	30 c.c.	= 1 ounce
Ammonium bichromate	1 gr.	= 15 grains
Water	100 c.c.	= 3 ounces

The solution must be several times filtered with care.

The plate should be rapidly dried, taking care not to heat too strongly, for the albumen would be coagulated.

The plate is immediately exposed, which generally does not require by a good light more than from three to five minutes; then in the room lighted by a yellow light one coats the plate with the following varnish:

Bitumen	5 gr.	= 75 grains
Ether, at 65 deg	100 c.c.	= 3 ounces
Alcohol, at 40 deg	1 or 2 drops	= 1 or 2 drops

This varnish is allowed to dry for five minutes. It forms a granulous layer easily imbued by the water into which the plate is immersed, and the development is affected in a few minutes, specially if the water is projected on the plate with force.

When the image is developed, the plate is rinsed with distilled water, then rapidly dried, then heated until the layer of bitumen, which is matt, becomes brilliant, and the plate allowed to cool. One can now proceed to the etching which is done with the greatest case.

I must say in concluding that the success depends on the good quality of the varnish of bitumen in ether, which, when dry, must form a fine and close grain. Certain bitumens give good results when dissolved in ether only; but others give a brilliant and continuous coating; in this case it suffices to add with precaution a few drops of alcohol to obtain the granulous appearance.

E. Vallot.

PHOTOMETER.

The photographer, Mr. Aug. Leutner, of Vienna and Berchtesgaden, well known for his hot burnishing machine "Fernande," has for the past two years been occupying himself with the construction of a photometer. It will soon be put into the hands of the trade through the firm of Julius Formstecher, of Vienna, and Offenbach a/M., and is to be called copying-clock "Fernande."

The problem Mr. Leutner set himself and which he has successfully solved was to construct an instrument which should make it possible—

1. To judge at a glance how far the copying process has progressed, without opening the apparatus or otherwise handling it.

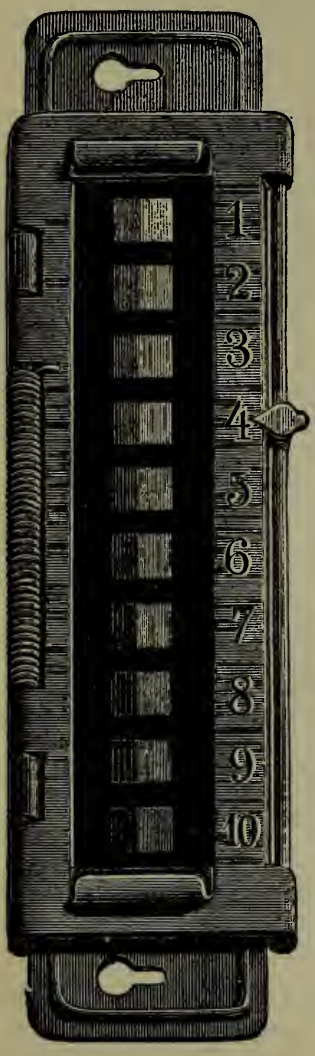
2. For totally inexperienced copyists to handle it with certainty.

3. To give it such form and arrangement as to enable it to be put on to any copying frame.

The copying clock "Fernande" consists of a metal basis which is firmly screwed to the copying frame, most suitably sunk to prevent the rack from being broken. To this metal basis is fastened a small strip of felt, which serves to press the sensitive paper firmly against the scale. The lid attached to a

hinge-joint and a strong spring, has the scale on its under side. A movable indicator fixed to a little rod serves to mark the degree to which one will copy. The scale itself is produced photo-chemically on yellow plate-glass.

The scale consists of 10 degrees, 1 to 10. But as with all care it is impossible to prevent the occurrence of little differences in the corresponding degrees of different photometers, they are compared with a normal or standard photometer, and so regulated that in the event of there being lighter glass or a brighter scale the numbers of the scale begin with 0, and the scale then goes only to 9, but with thicker glass or darker scale it begins with 2 or even 3, and goes to 11 or 12 respectively. This makes all copying clocks agree perfectly in the same number of degree. The equality guarantees the value of the photometer in an increased degree. On the lid are two clamps, enabling one to insert a yellow glass above the photometer, if it should happen that the thickness of a plate exceeds the highest degree of the scale.



The negative is put into the copying frame and served with sensitive paper. If it is a direct copying paper a small strip is laid under the scale and the frame then exposed in the ordinary manner to light. As one by experimenting with the first picture found out up to what degree it must be copied, or has one, by practice, learned to judge of the copying-clock degree by the thickness of the negative, then it is easy to copy all the following pictures to exactly the same degree.

If such a plate is then exposed the degree to be reached is marked with the indicator. The result of this is that the instrument makes it far easier for the photographer to furnish copies absolutely alike.

But still more, the employment of this copying-clock at a blow puts an end to all faults arising from looking after the

copies during printing, such as moistness of the one-half, copies not sharp owing to stretching or distorting of the paper, falling in of dust, etc., etc.

With non-direct copying papers, such as platinum paper, bromide of silver emulsion paper, and all other developing papers, a photometer is indispensable for working with certainty. With these papers the degree is determined with a direct copying paper, as, for example, silvered albumen paper.

For the sake of completeness I will mention here that the extremely ingenious invention, looked at from above, has the appearance of a blackboard with yellow squares which, beginning with light yellow, go on to the tone of burnt sienna or capuchin lake, just as if the glass cover were not monochromatic, but passing from light yellow to the darkest yellow-brown tone. Under one-half of the squares lies a strip giving it a somewhat darker tone; under the second half a strip of silver paper is placed. Through the lighting the two halves of the squares are equalized first, the lightest numbers 1, 2, and then the higher ones.

If the copying of the first experimental picture is finished at the time that the square No. 7 has become equal, the two shades of the copying degree No. 7 is fixed for the negative in question.

The price will probably be about three Marks. It is exceedingly neatly made, and the arrangement whereby the degrees of copying can be read from outside without, as heretofore, opening the apparatus, is a veritable boon.

L. Schrank.

TONING WET-PLATE SLIDES.

During the last five years lantern-slide making has become such a prominent feature in the work of both professional and amateur that the dry-plate makers have been devoting special attention to this manufacture.

Considerable advance has been made in the qualities of the various transparency plates placed on the market. So much so, that with some little attention and care in the development and toning, the dry-plate, for depth of shadow and clear high lights, approaches the beauty of good wet-plate slides, and will in time, likely, supersede the collodion—the dry-plate being so much easier to manipulate.

But as wet-plates still hold the first place for that depth

and vigor peculiarly their own, I wish here to give a jotting of a toning bath for this class of work which has given me the rich purple tones that are so pleasing in the wet collodion slide, and which so many workers have tried for and failed to obtain.

It is as follows:

After the transparency is developed, fixed and well washed, put it into the following solution:

Water..... ... 8 ounces
Sulphuret of potash (liver of sulphur)..... 60 grains

Let the slide remain in this solution for a minute or two. You can judge of the time by the tone the film takes on. When toned wash well and dry.

George Mason.

ON BODY MOVEMENT IN THE USE OF THE HAND CAMERA.

The injunction to stop breathing—to exercise the most extreme care that the camera shall be held immovable when making exposures, has been constantly, from its very birth, held up to us as a law in the use of the detective or hand camera.

It will, of course, seem heterodox when I assert that such care is in no wise needed—that the fear of movement of camera by, as I have seen stated, heart-impulse, thoracic or, again, abdominal respiration or movement, etc., is a "*bugbear*."

I have had sufficient experience in the use of the hand camera, the number of my exposures being in the thousands, to know whereof I speak. If one thinks for a moment of the use of the hand camera, he will see why such care is unnecessary. First, its exposures are mostly very rapid, instantaneous or snap-shots, in which the time consumed varies from the $\frac{1}{25}$ to the $\frac{1}{100}$, possibly even a less part of a second. Such rapidity of exposure is, of course, way ahead of the body-movement and completely nullifies it. With very slow exposures it is different, but I have never had any doubling of lines, or blurring of image with exposures of even half to three-quarters of a second, merely ordinary care being used in the holding of the camera steady with, for the moment, cessation of breathing. Again—from floats, row-boats, decks of vessels having every seemingly possible variety of motion (at least to a landsman), from steamers and trains under usual headway,

I have made exposures without hesitation, and secured fine, sharp negatives; and this I have no doubt is the experience of many, very many others. With the rapid exposures customary in the use of the hand camera, the factor of its movement is in truth "nil"—is a something that can be entirely disregarded. Often in exposing on a vessel, having only the water and sky for a background, or on a rapidly-moving object on land, with distant background, we follow up the one or the other, as the case may be, by turning body and camera after it, and so secure the better negative.

I am aware that some of our most able writers hold up constantly this body-movement as the cause of the blurring so often found present in hand-camera negatives.

It cannot be gainsaid, however, that "*experientia docet*" is the best rule for guidance. The real cause, or causes, of crude negatives, if the term may be allowed, in hand-camera practice is the use of poor—miserably poor—lenses; the use of lenses of insufficient covering power for size of plate; the use of too large a stop to gain requisite rapidity; the want of true focal adjustment of lens to distance of object, either or all of these combined, and not the want of steadiness in the holding.

J. J. Higgins, A.M., M.D.

TWO SUGGESTIONS.

I CAN strongly recommend the use of a lens shade, especially in out-door work.

Any one trying this for the first time will be pleased with the increased brilliancy of the negative over one taken without the use of a shade to the lens. We are often told that a single lens will produce a more brilliant negative than a double combination, and to my mind this is in a great measure owing to its mount, which, with the stop placed in front of the lens, forms a very effective lens shade, excluding all light except that which goes to form the image.

The shade can be constructed of any convenient material, but preferably in the form of a tube, covering and projecting in front of the lens; not, however, so far, or of such small diameter as to cut off any of the field of view covered by the lens. The inside of the tube should be painted a dead black, or lined with black velvet.

This recommendation is not put forward as original, its use

has been advised many times. But in the limited circle of my photographic acquaintance, I have never seen one in use except on my own camera. So I offer one more word urging its use.

I also desire to call attention to the use of a magnifier (I use a Darlot focusing glass) for getting a sharp image on the camera screen. And especially to a method lately described by Mr. E. J. Smith, in the *British Journal of Photography*, viz.: The eye-piece being carefully adjusted, five circular glass microscopic slide covers are to be cemented with Canada balsam to the ground-glass surface of the camera screen, one in the centre, and the others around it about one-half the distance from the centre to the corners. The screen will now appear to have five round holes cut through it, the Canada balsam having entirely removed all trace of "ground-glass."

The position of the view can now be arranged as usual upon the "screen." To adjust the focus, apply the magnifier to one of the "holes," and for all practical purposes the result is a telescope; every detail will be seen with a crispness and delicacy which will make one wonder how we ever previously managed to focus on the rough surface of "ground glass."

A further advantage is, that the use of a focusing cloth over one's head is unnecessary, except as it may facilitate the arrangement of the view on the screen, as the image is seen in the focusing glass clearly and distinctly in the brightest light. In fact a sheet of clear glass would be even better than one of ground glass for focusing purposes, except as the arrangement of the view might be facilitated by the latter. Try it and see.

F. E. Fairbanks.

PLAIN PAPER.

I DESIRE to use the opportunity, given by the editors, to say a word in behalf of a printing method that has not, in my opinion, received half the attention from photographic writers that it richly deserves. I refer to plain paper printing. The cost is slight and the results most satisfactory, fully equalling, if not surpassing, from my point of view, bromide or platinotype prints.

Plain paper not only retains detail and brilliancy, but yields an exquisitely soft picture, that is beautiful in the extreme. I have spent more time experimenting upon this process than any other branch of the photographic art, exhausting a number

of formulas, and have now settled upon a method, the success of which is greatly due to its simplicity.

I have never discovered a single advantage in introducing into the formula, anything but those chemicals that are necessary to produce the image, namely, the alkaline chloride, the silver nitrate and the vehicle necessary to hold the sensitizing compound formed by their union, which may be either albumen or gelatine, but preferably the latter, owing to the convenience of manipulating, as I will endeavor to show.

Prepare the salting bath as follows:

Water	12 ounces
Hard gelatine (Heinrich's)	8 grains
Ordinary table salt	120 grains

Heat the water to the boiling point, and in the meantime allow the gelatine to swell in water, then introduce it and the salt into the boiling water and stir until the gelatine is entirely dissolved.

There will be nothing gained by changing these proportions, if more gelatine is used you will only court trouble, because the greater quantity of it that you use the greater tendency it has to run unevenly when hung up to dry.

Now a word as to why gelatine is preferable to albumen. Previously I have advocated albumen, but it is more trouble to mix with the water and also more difficult to filter, and it is also apt to coat unevenly if it has not been thoroughly cut up.

To salt the paper, immerse it for three minutes in the solution, as this is better than floating, because you avoid the possibility of air bubbles, and it is also more effectual in filling the pores of the paper, which keeps the image upon the surface, which is absolutely necessary to secure brilliancy.

Of course, the solution must be kept hot in order to keep it in the fluid state, and this may be accomplished by arranging a small oil stove under the tray containing the solution by any convenient means.

The paper is then hung up by a clip to dry, after which it is sensitized by floating it upon a neutral silver bath, sixty grains to the ounce, for three minutes.

To obtain the best results, the paper should be fumed for ten minutes over ammonia.

Print deeper than you wish the print to be when finished, as it loses density during the toning and fixing.

Tone the paper in any good toning-bath, only dilute the bath by adding twice as much water as the formula calls for.

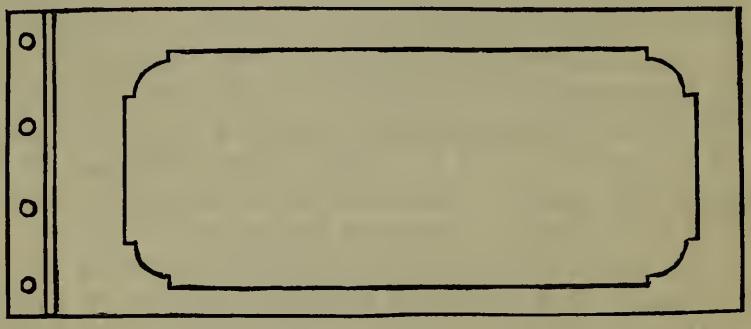
It will also work well, and give satisfactory results by using the "Bradfisch," the "Omega" toning-bath or a bath of like nature, which tones and fixes simultaneously, and gives, with any of the above baths, a wide range of tones from a warm brown to a purple or black.

W. S. Waterbury.

A CONVENIENT ALBUM.

One of my experiments not altogether new, but an improvement on anything in this line that I have seen, is an album, useful and ornamental, for amateur or commercial work.

Some of the appliances used, such as the special printing frame, can be purchased at less cost of time and money than it could be made by individual workers. Let us suppose that a 5 x 8 cliché is to printed from; use for this 6½ x 8½ paper, or 7 x 9, as best suits the taste. As to shape of book when completed, I make for this a metal printing frame with the space inside, clear, 4½ x 7½; also masks, made of paper and cloth, of suitable form to paste on the glass side of the cliché. A person of good taste will see what outline best suits the view or subject. This is one that will apply to most architectural subjects,



arches, circles with outreaching base and sometimes complete circles. With the mask and metal frame to print through the print will be sharp and clear down to the edge and needs no trimming, care being used in toning and fixing not to injure the edge of the paper. When ready to dry, I find squeegeeing gives very good results in amateur work, as burnishers are not always at command. As soon as the print is on the plate and all the moisture wiped off with a soft cloth (I wipe the roller, plate and print after once in contact, drying all excess as soon as possible), I then paste the back of the print; now

have some dry, thin, fine cloth cut for 5 x 8 work, $9\frac{1}{4}$ x $6\frac{3}{4}$. This makes one side of one leaf. This I lay on the print at once, while on the squeegee plate, and paste very carefully on the back of the cloth as I have also done on the back of the print. These when dry are pasted back to back, leaving at one end $\frac{5}{8}$ of an inch of double cloth for a hinge and binding. When this is partly dry put it under pressure between smooth, clean paper to complete drying. This leaf, so made, will not curl or get out of shape, but will be absolutely smooth if carefully done; the edge will need just a little trimming as the cloth will be a trifle in excess of the paper. To finish these leaves into an album, I use thin leather, book-binders' cloth, silk, plush, or any sort of material that may suit the taste. First I cut a strip one inch wide and so it will little more than cover each end of the hinge end of the leaf before trimming. When dry I make four holes in this end of the leaf which will then appear like this drawing. For covers I use No. 40 binders' board, cut 9 x $6\frac{3}{4}$, and for the hinge two pieces $\frac{1}{2}$ in. x $6\frac{3}{4}$. Hinge these on one end of the 9 x $6\frac{3}{4}$ pieces with soft cloth, leaving $\frac{1}{8}$ inch space between, putting cloth on both sides of the board and creasing it down on the inside; now cover the board, turn the edges inside and line it to suit; make four holes in hinge; when all is dry tie all together with two pieces of ribbon. This album will hold a dozen or a hundred views, as may be required, and will look well and be very durable.

J. R. Smith.

PHOTOGRAPHIC SIMPLICITY.

A WORD to the wise is said to be sufficient, and the amateur photographer has certainly acquired much wisdom during the last few years. In many respects he has distanced his professional brethren, for he is hampered by no such traditions as cramp the latter. The amateur may point his lens at the source of light, or refuse to take the portrait of a cross-eyed damsel with equal impunity.

The talismanic word for this same wise amateur, to be remembered above all the technical jargon about rival lenses, plates and developers is—SIMPLICITY. It is not necessary to enlarge upon the benefits to be gained from simplicity of apparatus. Only the merest tyro, feeling his own weakness, seeks to prop himself up by means of complicated devices, which, after he has made six good plates, he will promptly discard.

It is simplicity of subject that needs to be kept before the photographic eye. Classing subjects roughly as portraits, genres, landscapes with figures and cattle, views of travel and "snap-shots," the possibilities and limitations of each are easily presented.

In portraiture the subject is practically at the disposal of the photographer, who, after thoroughly mastering the means at hand for lighting, whether he has a studio, side-light from a window or an open barn doorway, with a cotton carriage-cover hung up for background, should study the natural poses of his subject instead of thrusting the patient into contortions that he fondly imagines are artistic. It may be that the "sitter" has some one good point and is very commonplace in all other respects. Turn this good point to advantage. If it is a braid of beautiful hair do not pull it over the shoulder as if on exhibition, but take a three-quarter back view with the face slightly turned towards the camera. If the subject has beautiful or expressive eyes, do not allow them to be turned up with a "calling-heaven-to-witness" expression, but let them look archly in the direction of the lens. Simplicity of pose must not be mistaken for monotony. Everybody has some slight point of difference from his neighbor which establishes an identity; be on the watch for this.

Above all do not crowd into your work inappropriate accessories or allow your sitters to put on all the jewelry they own or can borrow, or dress their hair in the opposite manner to their daily habit. We have all seen scores of amateur portraits, technically excellent, but so crowded with rubbish and writhing in pose, as to remind one of the primitive tin-type, taken years ago, of Bridget in all her mistress's cast-off finery, wedged between a rotund velvet chair and a spindle-table with one beefy hand clutching a marvelous bronze vase.

Find the best possibilities and then seek to develop them, reveal the graceful outline, let the face tell its own story, give inflection and softness, by massing your light and shade. Leave posturing to the bill-board photographers, and do not borrow their cheap thunder.

Genre work follows closely upon the track of portraiture, except that there is generally an idea to be presented, or a story to interpret. Again, do not overload your picture. After choosing your models, costumes, accessories, sift your material, and see how much you can eliminate without injuring your composition.

In landscape work with or without figures or cattle, the pho-

tographer is more at the mercy of his subject. He cannot move trees, buildings, and rivers to suit himself, but he may move himself from spot to spot until he finds the best point of view; and a scene which has no beauties from one point may develop many from another.

In order to secure success with cattle it is necessary to watch their haunts and habits, find the hour they are usually drinking in that brook you know so well; gauge the space they generally occupy and choose your point of view. Put a calico sunbonnet and gingham apron on the pretty cousin who is visiting you, give her a willow switch and place her by that bunch of alders that is in direct range with the watering place, focus your lens and—wait. The cattle come, they group themselves and drink long draughts—now—throw a pebble into the stream on your side of them—they look up—quick, uncap and recap (a snap-shot would not give detail in this shady nook) and you have a picture. It is impossible to drive or arrange cattle so as to make an artistic group. They have a worried, uneasy look, totally at variance with the desired unconscious calmness, the only way is to bide your time.

As regards figures for landscape it is best to follow the example of a noted English photographer and take your models with you. Chance models are a snare and a delusion. The average country child, boy or girl, is either too shy or too independent to be of any use. The former are either stiff as broom-sticks or collapse utterly, while the latter are purposely annoying. I came upon a pretty bit one day, a group of old willows, a stretch of water and a picturesque little lad fishing from an old tree thrown over the stream. As soon as I had arranged my camera, he turned his back and in answer to a request to turn his face replied "he had a right to stand any way he liked." The rustic child, in America, is a terror, so make up a few aprons, kerchiefs, sun bonnets and cheap figured petticoats and take your guests and neighbors on your outings, only remember, *simplicity;* don't let your hay-makers and berry-pickers look as if they were going to a masquerade, in Dresden-china costumes and high-heeled slippers. And in general, don't put too much on your plate—have an idea or select a view that suggests an idea and leave something to the imagination; over-elaborated pictures with every little detail carried out, everything equally distinct and of equal importance, but with no climax, have their place in railway guides and nowhere else.

In taking views when travelling more or less rapidly, one can

seldom select day, hour, or anything else, but here again one may avoid wasted plates by choosing *simple* subjects. Such subjects as can be controlled in a slight degree, and may reasonably be expected to turn out well. What is the use of taking instantaneous views of architecture demanding the clearest detail, or views of great distance, with a lens of wide angle?

Who has not seen the ubiquitous "Button-Presser" twisting his roll of film, and snapping away, with perfect faith, reminding one of the little boy with his bean-shooter, popping at sparrows aloft on the telegraph wires, unconscious that they are wholly out of range.

Lastly, snap-shots. Simplicity on this point consists in not complicating your photographic labors by taking instantaneously anything you can take with a time-exposure, however short. Quick plates are more difficult to develop; take a number slower, give more time, simplify your work in the dark-room. Try to confine snap-shots to your hand camera and you will be surprised to see what good pictures you can take, with short-cap exposures, of objects you always thought required the shutter.

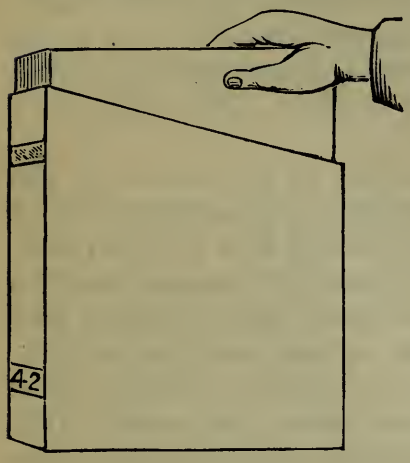
Finally remember that all arts have their limitations, and that there are still some subjects totally impossible to photography; keep your ambition in the region of possibilities, do not expect miracles, and, as the exception to prove the rule, avoid the mental simplicity of Simon, who expected to find whales in a water pail.

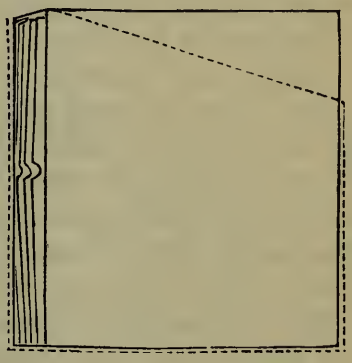
Mrs. James Osborne Wright.

TO PRESERVE NEGATIVES.

Owning some hundreds of negatives of various sizes, I have spent some time endeavoring to find some simple plan of preserving them from damp and scratches. At the same time I have tried to arrange a system of registration that would obviate the necessity of looking over the entire collection every time some special negative is required. This is the invariable accompaniment of the plan of piling up negatives indiscriminately on shelves. After mature deliberation I submitted a plan to a paper-box maker. The result was an order for 150 boxes of various sizes, each one holding one dozen of negatives. The boxes are in two parts, the cover being open at the end, which is cut at an angle of 20 deg. to facilitate

the extraction of the box when loaded with negatives. The box opens on the side edge (to coin a word) so that no matter how the case is handled the negatives do not fall out or get injured. In other words, the openings of the box and cover are at right angles to each other. The cases, as I call them, stand on the shelves properly numbered, and have the





appearance of a set of books. The negatives are first placed in envelopes or "bagged," properly numbered and labeled. A catalogue is then made, the number of the negative and case being placed opposite the subject. To find a negative wanted, it is simply necessary to refer to the catalogue, take out the case from its place on the shelf, and a moment later the negative is secured. It takes some work to establish this system, but once done it is easy to continue. You will appreciate its beauties after seeing your friend spend an hour or two looking up a much-wanted negative, finding it, perhaps, only after looking through his entire collection.

Robert E. M. Bain.

INTERIORS BY GAS-LIGHT.

It is not a matter of great difficulty to make interiors by gas-light, and good ones too. A little practice will soon give the proper length of time to expose the plate, and after that there is no trouble. It is, I find, seldom convenient to use the flash-lamp. There is great objection to its use on account of the smoke and dust. It is almost impossible to use a room with any comfort for an hour or more after making an exposure, and it is decidedly inconvenient, especially in cold weather, to

open all the windows and doors in order to clear the room of the stifling smoke.

The objection to making the negative by gas-light lies in the fact that but a portion of the room can be taken at a time. The camera must be so placed that none of the lights will be seen, hence if the source of illumination is the chandelier in the middle of the room, only one end of the room can be operated upon at a time. This, however, is not a very great objection, as it is seldom that a picture is improved by getting more than one-half of a room into the view. My method of procedure is is follows:

Light the burners in the chandelier in the centre of the room; place a lamp giving a strong light, on the right side of the room, and a small hand-lamp on the left side of the room, about in line with the chandelier. Place the camera on the tripod or a table, moving it backward until the gas-lights and the lamps just about, but not quite, appear on the ground-glass. Put in stop *f*/16 and give an exposure ranging from thirty minutes to an hour, and in some cases even more. It is my experience that the developer should be somewhat stronger in pyro than for daylight exposures, the tendency of the negatives being to flatness, but with a proper development there is a peculiarly soft effect, and a lack of harshness in the high-lights, that is very pleasing. My first attempt gave a negative that was rather flat and thin to make a good silver print, but by using Omega paper the result was very charming. The beauty of the process lies in the fact that it is cleanly, and the matter of time does not count against it, because one can set the camera at work and go about something else. There is little danger of over-timing. There is no smoke, no dust, and no disagreeable odor. A pretty corner of the room, the cosy work-corner with table and basket, the baby's corner, with playthings scattered about, all the comfortable nooks of the home, can be taken at their best and preserved in the album, to be laughed over and sighed over, and perhaps wept over, in after years when Time has wrought his relentless work for good or ill. What memories crowd the mind at the sight of an old picture. How happy we were in those old days when we took that picture. What days of darkness we have seen since then. If we could only go back for a while, how happy we would be. But time has gone on and those days are far away, and all that we have is this picture and this dear memory. This is the peculiar beauty, and the blessing, of amateur photography. It makes it possible to retain the shadow of the

home and the record of the home-life, a record which grows more and more precious as the years slip by and we reach that point of life where our sky is not without its clouds, and where we can look back and see the wrecks that time has scattered in our path. The making of this record is a fascinating occupation for the long evenings of the winter, the process is simple, and results sure, and well worth a trial at least, and a trial will demonstrate the fact that as good interiors can be made by gas-light as by daylight.

W. J. Hickmott.

WATER IN PHOTOGRAPHY.

The amateur photographer does not generally give to the development of negatives all the necessary care and attention; he thinks that it suffices to immerse the impressed sensitive plates in the bath and wait until the image is developed, leaving the chemicals to finish the action commenced by light, without in any way taking part in the work which he will, however, sign as being his own.

To compound the solution for developing the silver modified by light, he who buys a camera in order to get simple distraction, takes any formula among those, more or less excellent, found in the numerous publications which treat of photographic questions, and is surprised to obtain nothing but bad negatives with intense blacks and milky whites; I do not speak of half-tints, they do not exist in such plates.

There are four principle causes which co-operate to the production of a defective negative:

1st. Impure water employed for compounding the baths.

2d. The development termed *automatical*, invariably employed whatever be the conditions in which the plate has been made.

3d. The exposure time not well calculated.

4th. The imperfect lighting of the subject.

I purposely set aside other causes of a secondary order, such as fogging and the manipulations not proper to the process. I say secondary, because these causes depend upon the operator who, with a little attention and a rational method can easily avoid them.

On the exposure-time and the lighting of the subject to be photographed, all the authors agree; it suffices, therefore, to follow their indications. As to the formulas of the develop-

ing bath, and to the water which serves to dissolve or to dilute the chemicals, they are the two important questions to which I call the attention of the amateur photographer, and water is, without contest, the principal of the causes which intervene in the production of a bad negative.

The milky appearance of the transparent parts of a plate is produced by the water employed for the baths of development, or of washing and fixing, which contains in solution salts which by being deposited in the gelatine film produce a more or less opacity which prevents obtaining good positive impressions. *Any water not distillated is impure.*

Pure water, that is, that which *should* be employed in photography, must be neutral to the colored reagents, lime-water should not modify its limpidity, and a crystal of nitrate of silver must not have any effect upon it. Only distilled water is in these conditions, hence is it distilled water, and freshly distillated, which should alone be employed in preparing a developing bath.

In fact if the water contains in solution some bodies other than those especially indicated in the formulas, when the impressed sensitive plate is immersed into the bath, there is formed in all the thickness of the emulsion a whitish precipitate, hence the milky appearance of the negative. This precipitate of lime carbonate, generally, will be *fatally* formed during the washing in *ordinary* water which immediately follows the development of the plate before fixing.

If, on the contrary, one uses distilled water, which consequently does not contain any injurious matter, it is certain that after fixing the negative will present a brilliant image which will print rapidly and perfectly on the sensitive paper. It is well understood that the chemicals must be pure, but here the amateur photographer can only trust the merchant, the analyses of these products not being within his reach, we would then enter in the dominion of pure chemistry to which it is not necessary to arrive in order to obtain fine and artistic proofs, no more is it necessary to make a complete study of optics to practise the science of photography.

I have just said that, after washing, the negative will present a brilliant image if the developing solution is prepared with distilled water, and if the following washings are also made with distilled water. In fact the plate, developed and washed, holds a gelatinous sensitive pellicle containing silver not modified, that is a body having the property of troubling impure water; hence, if for compounding the fixing bath, one has

recourse to ordinary water, there will again occur a phenomenon of precipitation which will impair the transparency of the negative, which explains why they have generally a certain opacity in the parts corresponding to the blacks of the subject. In many cases this defect has only a relative importance, and the deposit in question may have no other consequence than to necessitate a longer exposure when printing the positive proofs, but when we want a vigorous image, well in relief, one must not depend on such a negative tinted in the whites in consequence of the use of a contaminated water.

As to the cliché for projection in which we require a pure and clear transparency in order not to offer any hindrance to the passage of light, distilled water is a *sine qua non* for all the manipulations, the fixing of the diapositive included.

Hence, water in photography plays an important part, and the amateur photographer, especially he who operates out-door, will do well not to be indifferent to the purity of this liquid and to not wholly rely on its limpidity, which absolutely proves nothing as to its good or bad quality.

E. Forestier.

MAKING PORTRAITS OUT-OF-DOORS.

I WONDER if young amateurs and beginners in photography understand just how simple a matter it really is to make good portraits and groups of one's friends out-of-doors. It can very readily be done, either with hand cameras or with tripod boxes, and with the ordinary lenses which usually accompany the cheaper class of cameras.

Personally I prefer a tripod camera for this class of work, and the better lens I employ, of course, the better photographs I can make. But it is not necessary to use a regular portrait objective.

The class of lens, known under various names, which belongs to the rapid rectilinear group is the best to employ for this purpose; such as, for instance, the Gundlach rapid rectigraphic, the Bausch & Lomb rapid Universal, the Steinheil antiplanetic, or, perhaps, best of all, the Swift rapid Paragon.

Perhaps the most important matter to be attended to in this class of work is the lighting of the subject. The figure or figures should not be posed in bright sunlight, but rather in a shady place, such as the shady side of a house, on the piazza,

or, if a group, on the steps. The best light is obtained on a day when light fleecy clouds abound, for then the light is pleasantly subdued, and a softer and prettier effect is obtained in the finished photograph.

In making a group, one must give thought to the pictorial effect to be obtained, and endeavor to arrange the subject in such a way that a naturalness is preserved as well as a pleasing effect. In other words, the endeavor must be to obtain a picture as well as a good photographic portrait of one or more individuals.

To aid a beginner in this matter I know of no better guide than Mr. H. P. Robinson, especially in his book on "Pictorial Effect in Photography."

As a rule, it is better to exclude dogs, and the babies, or very young children in making groups, for, when everything else is perfect, the slightest motion on the part of a child or an animal, both equally hard to keep quiet, will spoil the entire picture. The babies can much better be photographed separately when all the attention can be centred upon them.

Of course a rapid plate will be used, and a large stop in the lens. Make the exposure as quickly as possible, and, in the dark-room, develop slowly for roundness and detail.

W. Irving Adams.

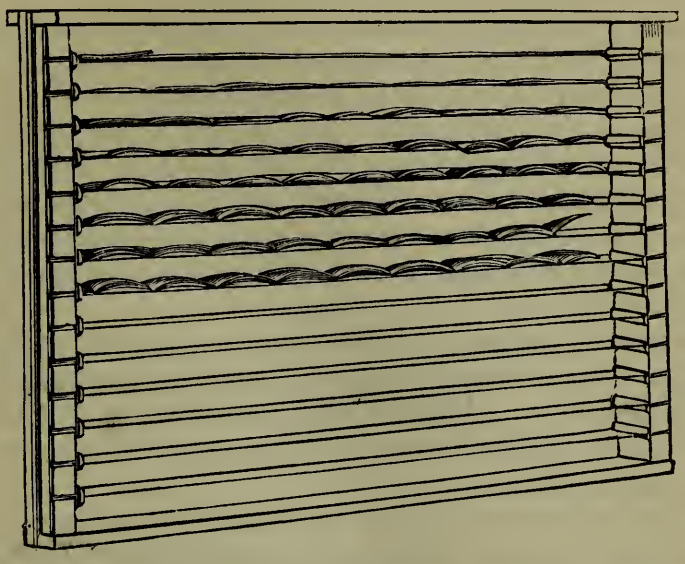
A CONVENIENT FRAME FOR HOLDING MOUNTED PHOTOGRAPHS.

The simple frame I am about to describe has proven so useful in my gallery in holding mounted photographs while they dry, that I have been led to describe it for the readers of the American Annual. It is easily made, and costs very little.

Select two pieces of plank, 2 in. x 5 in. and 30 in. long, clamp them together, and with a fine saw cut square across the edges, at intervals of two inches and one-eighth of an inch deep. Then select two boards, 4 or 4½ feet long and about one inch thick, and with these boards fasten the two planks together as shown in the diagram. Nail the corners very securely.

An ordinary piece of stove-pipe wire about 150 feet long will answer the purpose in making the support for the mounted prints. Fasten it at one corner, and wind it around the frame, in the grooves made by sawing, drawing it as tight as possible. Then insert a small strip under the wire, to strain it even tighter.

The frame will hold any size mounts, from cabinets to 8 x 10 size, and the first mounted prints will be dry enough to pack before two men can mount enough to fill the frame. The frame can be secured to a mounting table by a screw in the



centre of the bottom board, and if fastened on one corner of the table near one end it may be made to turn conveniently at any angle, so that either end can be readily brought within reach.

I have used this frame during the past six months, and would not be without it for many times its cost.

C. R. Arnold.

PHOTOGRAPHIC CHEMICALS.

Probably as much is taken "on faith" by the average amateur photographer in the reagents he uses as in the apparatus he purchases, the time of exposure of plates and other accompaniments of picture-making. Therefore a few words on the attributes of proper chemicals may not be superfluous.

The old story of cleanliness in every step is emphasized, for even with the best reagents, slight admixtures of impurities by carelessness are aggravated by bad "raw products."

We find complaints often with the manner the "pyro" works. This can be accounted for in a good many ways if used normally, or can mystify any one if not so utilized. Pyrogallic acid should always be white, dry, and in distinct, if

even very small, crystals, should dissolve readily in water, and not be kept in original packages for any prolonged period. After mixing in a developer it certainly loses its power when long kept, though the addition of a few grains of oxalic, citric or sulphurous acid will retard this change.

Sulphite of sodium should be in glassy crystals and not effloresced. By long-keeping and exposure to air it is oxidized into sulphate, by absorption of oxygen from the air, thus losing its value as a pyro-preserver. It is very frequently accompanied with small percentages of carbonate of sodium, and it is always safe to add a sufficiency of sulphurous acid to the aqueous solution before mixing a pyro bath until blue litmus paper shows an acid reaction. Bi-sulphite of soda can be used for this purpose.

Carbonate of sodium crystals, and carbonate of potassium, or salts of tartar of commerce are usually pure enough for photographic purposes. Where large percentages of chlorides are present they no doubt have a tendency to retard development of very rapid plates.

Bromides of potassium and sodium of commerce are usually pure enough, but for making very rapid plates care must be taken to avoid impure preparations. They must be free from chlorides.

Hyposulphite of sodium of commerce is pure enough for fixing if in dry, clear, well-formed crystals. To those workers who wish to use plates for enlargements or lantern-slides, the use of purified hypo is recommended. This preparation is in fine granules, and free from dust, chips, and impurities that will settle on gelatine surfaces, to their detriment. This is worth trying by comparison.

Neutral oxalate of potassium should be in well-formed clear crystals, and preferably show a trace of acidity than alkalinity. The presence of carbonate of potassium is sure to make the ferrous oxalate developer muddy, even if the protosulphate of iron solution shows an acid reaction.

Protosulphate of iron must be in good clear crystals, free from efflorescence, and of bluish-green color. When it is contaminated with persulphate of iron it loses its efficiency as a developer.

Nitrate of silver is generally sold almost chemically pure, and should be in fairly large, clear white crystals, dry and not effloresced. Traces of acidity are sometimes present and may cause trouble in albumen paper.

F. H. Rosengarten.

PHOTOGRAPHING THE EFFECTS OF THE GREAT EARTHQUAKE IN JAPAN, 1891.

When, on the morning of October 28, 1891, we, in Tokio, were awakened by finding the house over us rocking gently from side to side, the beams creaking and groaning, and every suspended thing swinging pendulum-like, it was only those wise in matters Seismological that recognized in this something very different from the shocks—often far more alarming than this one—that all of us had become so accustomed to. Said the Seismologically wise, however, "that's a big earthquake somewhere, and the centre is not out at sea, otherwise we should have had a tidal wave." They were right. Before night we knew that the centre had been southwest of us, and that the destruction had been great. By next morning we knew that both railway and telegraphic communication was stopped, and that the destruction had been fearful, but we did not know the extent of it. It was at this stage that the writer received instructions to join the expedition of investigation, and especially to secure photographs that might be of scientific interest and might form a permanent record of the earthquake.

I have described, in another place, as well as I could, the effects of the earthquake, and they have been described by many others better than I am able to describe them. For this reason, and because I am writing to a photographic annual, I shall describe only what appertains particularly to the photographic part of my work.

For outfit I had my 12 x 10 camera with lenses of the following focal lengths: 30 inches, 27 inches, 24 inches, 22 inches, 20 inches, 18 inches, 16 inches, 14 inches, 12 inches, 10 inches, 8 inches and 7 inches. It may be of interest to some to know that, in making 42 exposures the shortest focus used was 8 inches, the longest 22 inches, and that all the intermediate lenses except that of 10 inches, and, if I remember rightly, that of 12 inches, were used. Far the greater number of exposures were made with the lenses of from 16 to 22 inch focus.

Besides the 12 x 10 camera I had a quarter-plate camera that was fitted with a very rapid lens and a shutter so that it could be used for hand-work. The lens is Wray's rapid rectilinear, catalogued for 5 x 4, focus about 6 inches. It is very rapid, working at $\frac{}{5.6}$, and is as good a lens for hand-camera work as could be made. The camera itself is nothing but an ordinary quarter-plate camera of the best make. All the hand-camera

work I have done—and it is not a little—has been done with such a camera, and I do not particularly feel the want of anything more elaborate. Nine people out of ten will say of such an arrangement, "Why, you will attract the attention of the people you are going to photograph and your groups will be spoiled!" All that I can say is that if a little care be taken attention is not attracted. Of this I can give ample evidence.

Of plates I had five dozen for the big camera, six dozen for the small. As a means of changing plates, I trusted to what I have now depended on for years and have never found to fail. This is simply a few large sheets of a lemon-colored paper that both spectroscope testing and experience have shown is very safe for the amount of visibly useful light it allows to pass. Anywhere an empty box can be found and this, up-ended, the place of the lid taken by a sheet of the paper, a candle inside, gives a light luxurious to work with. I think if all knew the comfort of working with such a light, the sale of "portable lamps" would much fall off.

Of course all this made no inconsiderable load, and I was not without anxiety as to how it was to be carried about a district of which the only thing I knew was that railways had been shattered to such an extent that no train could run on them. As a matter of fact this is what took place. I missed the "scientific investigation party" through a mistake, and found myself in a train with the "medical relief party!" Our train went a certain distance towards the devastated district, we all the time looking out of the windows for any sign of the effects of the great earthquake. We saw not much. At one place a house had fallen and the roof lay flat on the ground like a pancake. This attracted our attention greatly, we little thinking that we should have to wend our way through miles and miles of street with the houses lining them all in this condition. We came to a small station beyond which the train could not go. We had some seventeen miles to go to Nagoya, the nearest large town within the devastated district and the only one from which news had come to Tokio, the condition of all beyond Nagoya being unknown.

Even after appeal to the local authorities, vehicles of any kind were barely to be had. Ourselves we walked, and it was only with the greatest difficulty that we got a couple of jinriska (literally "man-power carriage") to carry the photographic apparatus and the surgical instruments. Long before we had got to Nagoya the houses of the villages we passed through were partly, or entirely overthrown, and the people



W. K. Burton, Photo.

Capt. A. J. Russell, Engr.

EFFECTS OF THE GREAT EARTHQUAKE IN JAPAN.



W. K. Burton, Photo.

Wm. Kurtz, Engraver.

EFFECTS OF THE GREAT EARTHQUAKE IN JAPAN.

were living in little temporary huts in the middle of the streets. This was a curious phase of life everywhere through the smitten district. Even those whose houses remained inhabitable were terrified to enter them, for there were continual small earthquakes. At Nagoya we put up at a large hotel only partly wrecked. We were given dinner in the hotel, but after that all the people of the house deserted us, leaving us alone whilst they pitched their tents in the open street. In the morning I found that I had met with a loss. The ways of the medical party and of myself parted here, the medical men—or surgeons rather—had got up at some unearthly hour, and had taken my hand camera with them. This prevented me from getting what would have been very interesting, namely, the "koya" or temporary hut-life just after the great disaster. I got some good examples of this a few days afterwards when, through the exertions of my friend the chief of police at Nagoya I had got the hand camera again. Let it not be supposed that because I mention the chief of police I accuse my medical friends of robbing me of the camera. They took it by mistake, but in Japan the chief of police is a good friend to have, because he can command services that cannot be got in any other way. In this case he scoured the country in the various different directions that the members of the medical party had taken.

At Nagoya most of my time was taken up photographing a part of the town called Biwajima, where the houses were simply reduced to continuous heaps of rubbish. Through piles of *débris* and rubbish of every description it was necessary to carry the camera. The poor people who were working at the ruins of their houses were very good-natured, always lending a helping hand where they could.

A large spinning mill was at Nagoya. It collapsed almost entirely, tearing down high chimneys and solid walls, crushing to death a great number of the workers, most of whom were girls.

After Nagoya the greatest difficulty was simply to get the gear carried about. If it is taken into consideration that what had been a road once, was now covered in various heights with fragments of rock, stones, sand and piles of earth, and that for miles and miles we had roads no better than this, some idea of the difficulties of transit will be obtained.

In the distance we saw Nagaragawa Bridge. When near to it, we were much better impressed with the enormous power of the earthquake than with anything else we had seen before.

Cast-iron columns, filled with concrete, have been snapped across like carrots.

The first picture represents a scene up neo-dani, or Neo Valley. This place is supposed, by some, to have been the source of the earthquake. I do not believe that it was, but certainly the disturbance here has been very great. The houses seen in this photograph have simply sunk right into the ground. All the inhabitants were buried, and, so far as I know, were never unearthed.

The second photograph I show is one of the life of the people after the earthquake. It shows a little temporary house, with the remains of the family working about it. At the time that that photograph was taken, the life of those survivors who could get food was quite bearable, because the weather was warm, and sleeping even out of doors was no very great discomfort; but the suffering during the winter was terrible. The winter began unusually early, was very severe, and lasted till later than usual. During all this time about a million people were homeless but for huts such as the illustration shows.

I came home with three and a half dozen large negatives, and about the like number of small. Of these only a few were otherwise than good, and not a single one was spoiled by either under or over-exposure.

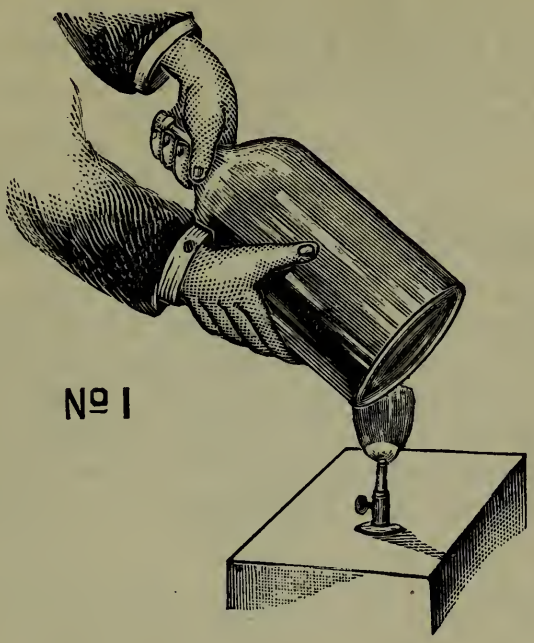
W. K. Burton.

AN INEXPENSIVE SILVER-BATH FILTERER.

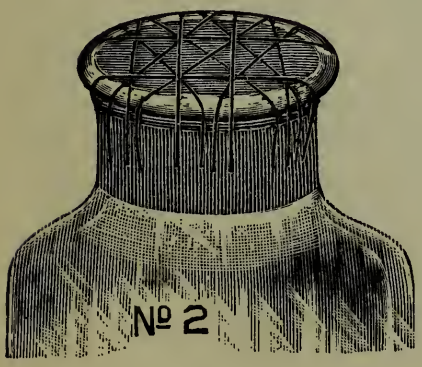
Believing that practical hints are what the majority of the readers of The Annual are looking for, I present the following, hoping that it may be of use to some one who, like myself, has become disgusted with filter paper and like devices:

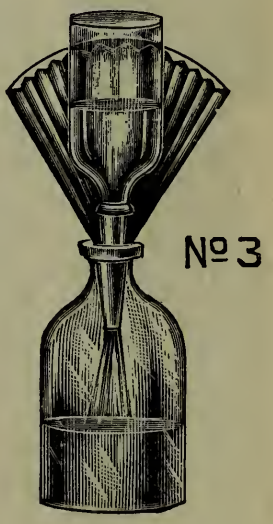
Take an empty five-pound soda bottle, and remove the bottom. There are a number of ways of doing this, but the one I find easiest is to revolve the edge rapidly along the flame of a gas burner (Fig. 1) till it is heated uniformly all around. Then plunge it quickly into water and the bottom will crack around and drop out. After filing off the sharp edges left by the break, the funnel part of the filterer is completed and all that remains is to fix the filtering cotton in what was formerly the neck of the bottle. First sew a piece of cloth around the neck, and by stitching cord through it, draw it tightly across the mouth so as to form a net work as in Fig. 2. Then pack

the inside of the neck with the cotton, sewing it to the net work to keep it in place, and the thing is done. If after



testing it with water it is found that the solution runs through too rapidly, by adding more cotton and packing it more tightly





the flow can be checked to any extent. Fig. 3 shows the filter in use—a ribbed funnel being the best to use as it

allows the free escape of air from the lower vessel. Care should also be taken to guard against the upsetting of the apparatus as it is somewhat top-heavy when the filterer is first filled with the liquid. When not in use it should be kept in a closed box, away from light and dust: the cotton will then always remain white and moist and can be used for a long time without change.

J. Will Barbour.

DEVELOPERS FOR TRAVELLING PHOTOGRAPHERS.

In these days of "annihilated distances" when no traveller's outfit is complete without his camera, it is not only desirable but necessary to successful work, that at least a few of the negatives taken in each different locality visited, be developed at once, and for that purpose the writer has found the following original formula most convenient by reason of its extreme portability, simplicity, and adaptability to all makes of films and plates:

Sulphite of soda, granular.....1 ounce, 1½ drachm
Carbonate of soda.....6 drachms
Hot water..... 8 ounces



For use take of this 4 drachms, water 3½ ounces, dry pyro 12 grains.

This solution is most safely carried in one of the corrugated protecting cases, as shown in the illustration, containing also the graduate, the glass stopple of bottle being discarded and a rubber cork substituted or the traveller may find himself far from any source of supplies and unable to open his bottle.

An 8-ounce case of this kind will carry sufficient solution to make 64 ounces of mixed developer. The pyro (dry) is best carried in a bi-carb. soda bottle, which can be obtained at any druggist's, the stopper of which encloses a bone spoon, holding almost exactly 12 grains.

For those who favor the eiko-hydro developers the following adaptation of another's eiko hydro developer will do good service.

Grind together carefully in a mortar:

Granulated sulphite of soda.....240 grains
Carbonate of lithia..... 60 grains



Samuel W. Brugham, Photo. Electro-Tint Engraving Co., Engravers.

And divide in twelve powders of 25 grains each, wrapping each powder in waxed paper; label these A.

Then grind together, as before:

Eiko	100 grains
Hydro	80 grains

And divide in twelve powders of 15 grains each; label these B.

For use take water 4 ounces, 1 powder A, 1 powder B.

In this connection the use of the Watkin's exposure meter can not be too strongly urged; by its help the writer has obtained many valuable negatives under the most unfavorable conditions when it would be impossible for him to repeat the exposure if unsuccessful, and this experience is shared by a constantly increasing number of successful workers.

J. A. Vanderpoel.

EQUIPMENT FOR A TRAVELLING PHOTOGRAPHER.

The photographer, in foreign lands or out-of-the-way places, who has had no experience in travel abroad, will meet with many disappointments and trials which he would know how to provide against on a second trip. I have had my share of experiences of this kind and perhaps a few words as to the best way to travel in countries where nothing in the photographic line can be bought, will be useful to some readers.

First as to the camera. If it is not of the best quality, carefully made of well-seasoned wood, it will give no end of trouble. In a dry country it will fall to pieces, in a wet season it will swell so that the plate-holders will not fit and the slides will not move. I carried a Scovill Albion camera all through my travels in China and it stood the trying climate well, but even that excellent camera swelled slightly, the sliding front became fixed and the celluloid slides of the plate-holders buckled, so that I had to take them all out and hang them up in the boiler-room of a steamship to dry. For a country like China the moving parts of a camera should not be fitted too finely—expansion is certain to take place with the best-seasoned wood.

There should be no screws on camera or tripod that can come out and be lost. It is surprising how travelling causes screws to work loose. As for the best size of camera to carry, it must be said that unless one is to live in the country, or at least can travel about at leisure, an 8 x 10 camera is entirely too

large. Not only is it heavy, bulky and inconvenient in many respects, but it requires so much longer to set up that the natives have time to congregate in immovable masses in front of the lens before one can get a picture. A camera of that size is too conspicuous and leads to many a failure to get pictures which with a 4 x 5, or even a 5 x 8, might be easily taken.

Another serious matter connected with the large camera is the bulkiness of the lenses. I found great satisfaction in the possession of a Clark lens, made by the Bausch & Lomb Optical Company, which was small enough to screw inside the Albion camera when closed. This lens covered the plate with perfect sharpness, and was doubtless used for nine-tenths of my work in the East.

It is not necessary to have a great battery of lenses. One should have a good wide-angle lens, a rapid symmetrical or the more compact Clark lens as a substitute, and an additional lens of long focus of the symmetrical type is occasionally very desirable. The two last mentioned should be provided with shutters for instantaneous work.

I do not generally advise hand cameras. There are two classes of people who can use the hand camera with satisfaction, viz., novices, and photographers of long experience—the former because they can use nothing else, the latter because they have good judgment and know when to touch the button. But as hand camera pictures go, most of them leave much to to be desired. Nevertheless, in competent hands the hand camera of about 4 x 5 size is invaluable for catching some phases of the life of eastern cities.

As regards plates, I have used glass plates for nearly all my work, but I should think the roller films now in use would be entirely satisfactory. The weight of glass plates is a very serious item in an outfit for a long journey; but generally one can carry half a gross of 8 x 10 plates as readily as a smaller number, because they can be packed in a wooden box of the proper size with the top screwed on, and carried with the supplies. I have found that four double holders are usually quite sufficient for a day's work. If one finds more than eight subjects to photograph in a day he must be in a very interesting neighborhood indeed. Of course I do not now refer to general scenery, landscapes, etc., for one does not make journeys of tedious exploration merely to get pictures of landscapes. Moreover, with a large camera in a strange country, one does not use his plates without some discretion and regard for the possibilities of future discovery.

Far from the conveniences of a dark-room, plates must usually be changed at night. For this purpose some kind of a folding lantern is desirable, although I have travelled many a mile without even that, changing my plates in total darkness. But that is tedious and unpleasant. A simple lantern can be carried in a small space and is a great convenience. But if it is intended to develop a plate now and then on the way, a course I would strongly recommend, a better lantern should be carried. It is poor economy to try to develop with insufficient light even while travelling.

Perhaps the most troublesome and confusing undertaking of all is to keep a record of the exposed plates, so that when one begins to develop at home he can know in advance what subject is on each plate, and such particulars as to light and exposure as may be desirable. I think I have reduced this down to a system which is entirely satisfactory. An imaginary extract from my notebook will aid in making this subject clear.

No.	Ex. No.	Subject.	Date.	Hour.	Lt.	Lens.	Stop.	Exp.	Plate.	Holder.	Dev.	Remarks.
			1892.									
246	368	Temple...	Mar. 15.	10 A.M.	S.2	C.	256	4″	C.L.	I.	Eik.	O. K.
—	369	Street scene....	"	11 "	"	"	64	S.2	"	II.	"	Foggy
247	370	Street scene.....	"	11.30 "	"	"	64	S.4	"	IV.	P.	1st Class
248	371	Bridge and mill.....	Mar. 17.	9.15 "	S.Cl.	"	128	I	S.	VII.	P.	U.Ex.fair
—	372	Stream in woods...	"	10 "	S.Cl.	"	128	I	"	VIII.	Eik.	U.ex.n.g.
249	373	Landscape and cows.	"	12 M.	Cl.	"	256	2″	C.L.	V.	"	O. K.
250	374	Farm house....	"	12 15 P.M.	S.Cl.	R.W.A	1	3″	"	III.	"	O. K.
—	375	Milking cows at evening..	"	6 "	S.4	C.	64	I	"	VI.	"	U. Ex.

The first column, headed "number," includes only those negatives which are worth preserving. It is, therefore, only filled in after the negatives have been developed and these are numbered consecutively with a diamond, so there are no gaps in the series. Plates which do not yield satisfactory pictures are left without numbers in this column. Just here let me say that I often use 5 x 8 plates in my 8 x 10 holders. Now, it is inconvenient to file away negatives of different sizes together according to consecutive numbers. I have, therefore, a different series of numbers for each size. Number 1–499, for example, may be 5 x 8 size; 500–1000, 8 x 10 size, etc. Of course these two series of numbers can run on together in column 1, and the numbers would always indicate the size of the plates.

The exposure numbers in the second column are only temporary. They show the number of plates exposed. A certain proportion of these will not develop into satisfactory pictures, hence, this column is only intended to preserve the identity of the plates until after development, when, if good, they receive their permanent serial numbers, in column 1, if bad they are rejected. Now as to the best way of attaching the temporary number. It may be written with ink on the back of the plate as taken from the holder, but then the number washes off in development. My plan is this: I have a strip of gummed paper on which I write the numbers of the exposed plates in a vertical column in the inverse order of the plates as they lie in the dark slides—that is, as I have four double slides the plates will be in order I., II., III., IV., V., VI., VII., VIII. Observe that this arrangement may not correspond to the numerical order of the exposures in column 2, for, as in the fictitious record from the notebook given above, it will often happen that the plates are exposed in irregular order. Now, it would be very awkward to take the negatives out of the holders in that irregular order in the dark-room. I therefore arrange the holders in a pile so that the plates can be taken out in regular numerical order according to the holder numbers, No. I. on top and No. VIII. at the bottom. I then take a strip of gummed paper and from my notebook write on it as follows:

372 Stream.....VIII.
371 Bridge..... VII.
375 Milking..... VI.
373 Landscape..... V.
370 Street..... IV.
374 Farm H..... III.
369 Street..... II.
368 Temple..... I.

The Roman numerals are only put on for convenience of the reader. I do not in practice write them on the strip. Then with a scissors I cut the paper nearly across between the numbers, leaving them hanging together but readily torn apart. Pinning the strip to the lapel of my vest I enter the dark-room and take out the exposed plates in regular order attaching the bottom paper of my strip to the back of each one in turn. This can be easily done in total darkness. The record is thus perfect, and there is far less trouble about it than there may seem to be from this long description.

As for the column headed "subject," nothing need be said

except that the first three columns together fill one page in the notebook.

On the opposite page we have date, light, which is recorded by arbitrary symbols—S for sun, Cl for clouds, R for rain, and intensity by numbers 1–5, which will vary with individual estimates. The exposure is marked in the usual way, except that S stands for an instantaneous shutter exposure and a numeral attached indicates the tension or speed of the shutter. I stands for an instantaneous exposure with the cap. The other columns need no explanation.

The system described has been used by me for many years. Some of the data are of no special value except in particular cases when, owing to peculiar conditions of light, an important subject is not well taken and one wishes to repeat the exposure on a subsequent occasion. The data are then extremely useful. For the beginner a complete record like this of all his exposures is very instructive. The first column shows his successes, the second his failures, and the data on the next page the reasons for the failure.

Now as to carrying chemicals for developing on the way. I do not advise much developing work in the course of a journey, for the reason that such work can be done so much better at home or in a good dark-room, where all conveniences are at hand to correct errors of exposure. The most convenient and reliable developer to carry is pyrogallol. One should have for a long journey a stock of the following chemicals in the solid form:

Soda carbonate.
Soda sulphite.
Soda hyposulphite.
Pyrogallol.
Bromide of potassium.
Alum.
Oxalic acid.

For an absence of only a week or so from the base of supplies, I would only carry hyposulphite and pyrogallol in the solid form. I would have the following solutions:

1.—Alkali for Developer.

Saturated solution soda carbonate..... ½ ounce
Saturated solution soda sulphite.....4 ounces

This makes 4½ ounces of the most concentrated alkali possible. I am aware that saturated solutions are of very indefinite strength, but I am not discussing any theories now, nor

splitting hairs over variations in the strength of the developer. Let these saturated solutions be made at ordinary temperatures, anywhere between 60 and 80 degrees Fahr., and they will do perfectly well. My purpose is to avoid carrying a lot of unnecessary water in bottles and at the same time to render weighing of soda and sulphite unnecessary every time one wishes to develop a plate.

To make a developer, take of the mixed solution 1 part and add to it water 4 parts, and dry pyrogallol 2½ or 3 grains to each ounce of the diluted solution. It is easy to gauge the quantity of pyrogallol without weighing it, but of course it is better to have a scales to insure more accuracy.

2.—*Alum Solution.* I use a saturated solution acidified with oxalic acid. A 4-ounce bottle of this will serve to clear many plates.

3.—*Fixing Solution.* This is made as required from the solid hyposulphite and thrown away after use.

4.—*Bromide Solution.* A half-ounce bottle of strong bromide of potassium solution will suffice for a long time. I never use bromide unless the development calls for it, and then I use enough to show immediate effect—half-way measures with an over-exposed plate are fatal to successful development.

My outfit, therefore, is made up of a 5-ounce bottle containing alkali solution to make 20 ounces of developer—sufficient to develop 10 plates, of 8 x 10 size, with a fresh developer for each; a 4-ounce bottle of alum solution, a half-ounce bottle of bromide, a bottle of pyrogallol, and a bottle of hyposulphite of sodium.

As for trays, one is sufficient, but two can be carried as well as one. The best are made of celluloid, and if the bottoms are ribbed it is a saving of solutions to have the ribs depressed, instead of elevated as they so frequently are.

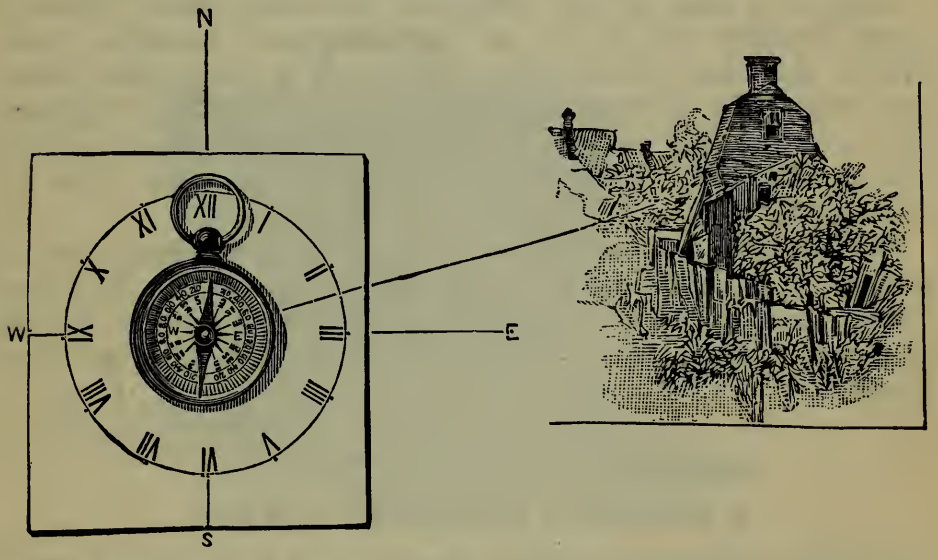
For a lantern I actually prefer a wooden box with a sliding glass front and a chimney made of a tin can, with a candle for a light. This is better for travelling than a good metal lantern, because it is less liable to injury and is easily repaired, but principally because it occupies less space. In fact, the lantern box is used as a receptacle for the chemicals. The sliding glass front of ruby glass is cut across with a diamond, paper pasted over the cut to serve as a hinge, and the two sections folded together. It will then pack securely in the box. The chimney comes out and serves as a protection to a bottle set within it. No solder should be used in making the chim-

ney. The parts should be put together with rivets. I made a good one once with a condensed milk can, and a tin box cover a trifle larger than the can which was set over the latter as a hood to prevent radiation of light. A box with a sliding cover can be found at a grocery store, and ruby glass can be cut to fit into the same groove as the lid,

Romyn Hitchcock.

AN AID IN THE PHOTOGRAPHING OF BUILDINGS.

A CONVENIENT contrivance for finding at what time the sun will shine directly upon a building from a given direction, may be made from a compass and watch dial, thus:



Place the compass over the face of the watch in such away that the magnetic needle will point toward the numeral twelve. Then imagine a straight line passing from the centre of the dial to the centre of the building. The numeral on the dial which this line cuts will indicate the required time.

Since the hands of the watch are of no use in this computation, a circle of cardboard made to represent a watch dial, and fitted over a small compass is more easily used.

The accompanying sketch will give the idea.

The best time for taking a picture of this old house is between two and three o'clock in the afternoon.

I had occasion during the late autumn to photograph a large number of public buildings, some of them being

located in places where the points of the compass were unfamiliar to me. This device simplified matters considerably. I first went over my ground with compass and note book, and decided approximately on the best time for each building.

Then I could start out confidently with my camera.

Of course, it is neither necessary nor desirable to always have the sun at one's back.

The strong light should come from such an angle that both light and shade appear upon the building, and cast shadows are thrown in such a way as to improve the pictorial effect. But it often happens that a building faces north, or nearly so. In such a case, great care must be taken in selecting a suitable time for photographing it. And this time may be very limited.

Again, in case of an irregular building, where there is large latitude of choice as to the most desirable view. When this has been decided upon, it is often most necessary that this particular part should be strongly lighted; and a knowledge of the exact time when the light is most direct, will help materially in selecting the best time for taking the view.

While this device may not be entirely accurate for all seasons, I have found it nearly enough correct to be a real help. And if it is a new idea to other readers of the Annual, I hope that they will find it a good thing to know about.

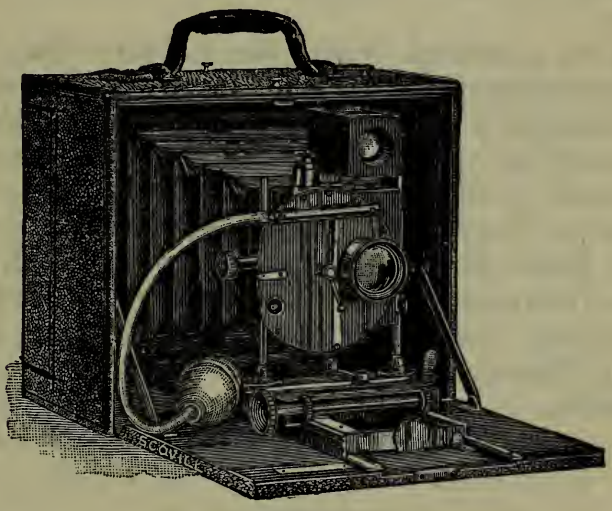
Mary S. Turner.

A SPLENDID ALL-ROUND CAMERA.

On the table before me is placed a neat black box covered with morocco leather, which certainly has no outward indication of its photographic properties. A close examination reveals two black studs on the top, and one on one of the sides. There are also two circular apertures (for manipulating the roll-holder without removing it from the camera) on the bottom of this box. On the top is a square leather handle. The box measures ten inches by eight inches, by a little over eight inches. Its weight is five pounds and three-quarters. I press a stud, part of the back flies open, exposing the deeply-recessed focusing glass; it is plain that I shall be able to dispense with that great nuisance, the focusing cloth. On pressing the second stud the front of the camera falls down and is locked in position by two brass struts. This front now

forms a base-board; it carries brass grooves upon which the front of the bellows slides, and the bellows are pulled out and the rack-work clamped down by means of a screw. There is now a focusing range of 7½ inches, the distance of the lens from the ground-glass varying from 4½ inches to 12 inches. A lens of about 7 inches focal length will probably be found the most generally useful, and other lenses of 5½ and 8½ inches focus will complete the "battery."

The camera front possesses very remarkable powers of adaptation. It can be raised or depressed over a space of above two inches; it swings both ways from its centre (thus giving vertical lines on the ground-glass, although the tripod may have been either tilted or depressed); it has a lateral motion of 2½ inches, and it can even be bent round until it looks like



the Irishman's gun, which was made to "shoot round the corner." In any of these positions it can be instantly and firmly clamped by a brass lever, and indeed the strength and rigidity of the whole instrument is remarkable. All the wood-work is of finely-polished mahogany.

With this camera I have a roll-holder (weight 1½ pounds) and six dark slides (weight ½ pound each). If the camera be made for use with dark slides only, there is a saving in size of about 2 inches in height and in breadth; but the advantages of being able to use either films or glass are so great, that the slight increase in size is but a small price to pay for them.

The camera can be used either on stand or in hand. It has two holes for the tripod screw, so that either vertical or horizontal pictures may be taken. An important feature is the

excellent *finder* which is fixed upon the top of the movable front; by the aid of this, combined with a focusing scale beneath, there is really no need to use the focusing glass at all. This finder reverses both for vertical and horizontal views, and also so that the picture can be seen either from the top or from the side, the latter position being the best when the camera is used on a tripod.

The size of plate is 7 inches by 5 inches; well-suited for all-round work, and large enough not to look insignificant.

This camera is the "Henry Clay," made by the Scovill & Adams Co. I saw a description of it in *The Photographic Times*, which led to my purchasing the instrument. It is the sort of camera which a man can "make a friend of;" it has now been my constant companion for several months, and it is beyond doubt a most compact, well-made and convenient instrument.

Made with a special front, the "Henry Clay" forms an admirable stereoscopic camera. To those who want a first-class article, light yet capable of taking a good-sized picture, inconspicuous in appearance, easy to manipulate, available either in hand or on stand, capable of doing all-round work—I say, "Get a 'Henry Clay,'" and you will never regret it. I have had Ross's New Concentric Lens of 7 inch focus fitted to my own instrument; and I hope soon to send the editor of the ANNUAL some specimens of work done in the "old country" by this combination of American and English genius and ingenuity.

W. Jerome Harrison.

MORE PORTRAITS OF DAGUERRE.

Since preparing the article for the 1891 issue of The Annual on "Portraits of Daguerre," additional material has presented itself, which has seemed of sufficient interest to warrant its appearance here.

Corresponding to the lithograph in the second edition of Daguerre's book, "History and Description of the Daguerreotype and the Diorama," and evidently copied from it, is a German lithograph by "Em. Baerentzen, lith. inst." The example in my possession has the word "Portefeuillen" embossed underneath the title, and the back has the impression of a page of type which has "offset" against it. From these facts I conjecture that it appeared as an illustration in some periodical, perhaps having the title "Portefuillen," about 1840.

Another German lithograph answering pretty nearly to the same description, perhaps following the original closer, published at "Stuttgart Literatur Contoir," the name of the draughtsman being W. Kluda, is in the collection of autographs and portraits of Mr. H. F. Woodward, of Boston, accompanying an autograph letter of Daguerre, written in 1834, on a subject not connected with photography.

In response to a letter of inquiry, I received from M. Paul Nadar a heliogravure print from an original daguerreotype in his possession, concerning which he says, "I had this portrait from my father, to whom it was given by Mr. Vernet, who was a poet-musician, well known by the music he wrote to the words of Musette's song in Murger's 'La Vie de Boheme,' commencing 'Ce soir, en regardant une hirondelle.' He has been dead some time now; in the latter part of his life he set up a small photograph gallery, but I never knew exactly how he obtained this daguerreotype, which is assuredly the best of all that I have seen."

A reproduction from the heliogravure is given herewith. The heliogravure plate, or the crayon from which it was taken, has been so much "worked up" as to interfere with its value as an original.

Mr. Wm. Lang, Jr., of Glasgow, has suggested that the head of this portrait may have been the original of the "Harrison" picture, alluded to in my previous article. Although there is a certain resemblance in the attitude and costume, this fails when particulars are noted; especially the decoration in the coat lapel (in the Harrison picture), which is

replaced by the button, on the other side, in the Nadar; the angle of the head with the shoulders, and the direction of the eyes. I would say that the two portraits were of about the same epoch; perhaps made within a few days of one another, but in different costume.

M. Nadar also mentions another daguerreotype portrait in the possession of a friend of his; but I have not yet succeeded in obtaining a copy.

Coming now to the portraits made by Charles R. Meade, I might mention, in passing, the plate that appeared in Appleton's American Cyclopedia, finely engraved on steel, following the wood-cut by Orr, illustrated on page 29 of the 1891



Monument to Daguerre at Bry-sur-Marne.

Annual. I have heard also of a large lithograph, made after one of the Meade originals, by D'Avignon, in New York, early in the fifties, but have not succeeded in finding one.

I have, however, found reproductions from two more of the Meade originals, which will account for five in all, out of the "five or six" said to have been made. Designating them by numbers, for convenience, I will call No. 1, that still in the possession of the family, belonging to Mrs. Valentine; No. 2, the National Museum portrait; No. 3, the "Mayall" example. These all appeared in connection with my former article. No. 4 is from a *carte-de-visite* print in the possession of Charles Ehrmann, Esq., of New York. This print bears no name,

but is very similar in appearance to many that were made in the Meade gallery, and I consider that it was undoubtedly made there, from the corresponding original. In treatment the portrait very closely resembles No. 3; differing only slightly in the position of the head, and of the hand in the lap, and also in the fall of the coat-skirts over the arm of the chair.

The copy of No. 5, which I have, appeared in the *Photographic and Fine Art Journal* for February, 1855 (New York), in the form of a "crystalotype," by J. A. Whipple. The outline is oval, like Nos. 3 and 4, measuring $7\frac{1}{2}$ x $5\frac{1}{4}$



Monument to Daguerre at Corneilles-eu-Parisis.

inches; the chair is the same, the position of the head and the hand supporting it is nearly the same, but the hand in the lap is spread out more widely, and the coat-skirt does not appear. The title of the plate adds to the name the following: "From the original and only life picture in America, taken by and in possession of Meade Brothers." The text, however, reads, "from one of the celebrated daguerreotypes taken from life, by the Messrs. Meade Brothers of New York."

The question of the present location of the originals of Nos. 4 and 5 still remains open, however. It is understood that at



House in which Daguerre Lived, 15 Rue de Marais, Paris.

one time the Meade gallery was in the hands of Levi Chapman, a supply dealer, in consequence of some legal proceedings; and it is possible that the originals, if still in the gallery, disap-



DAGUERRE

From a German lithograph by "Em. Baerentzen, lith. inst.

A copy after the original in Daguerre's book.



DAGUERRE

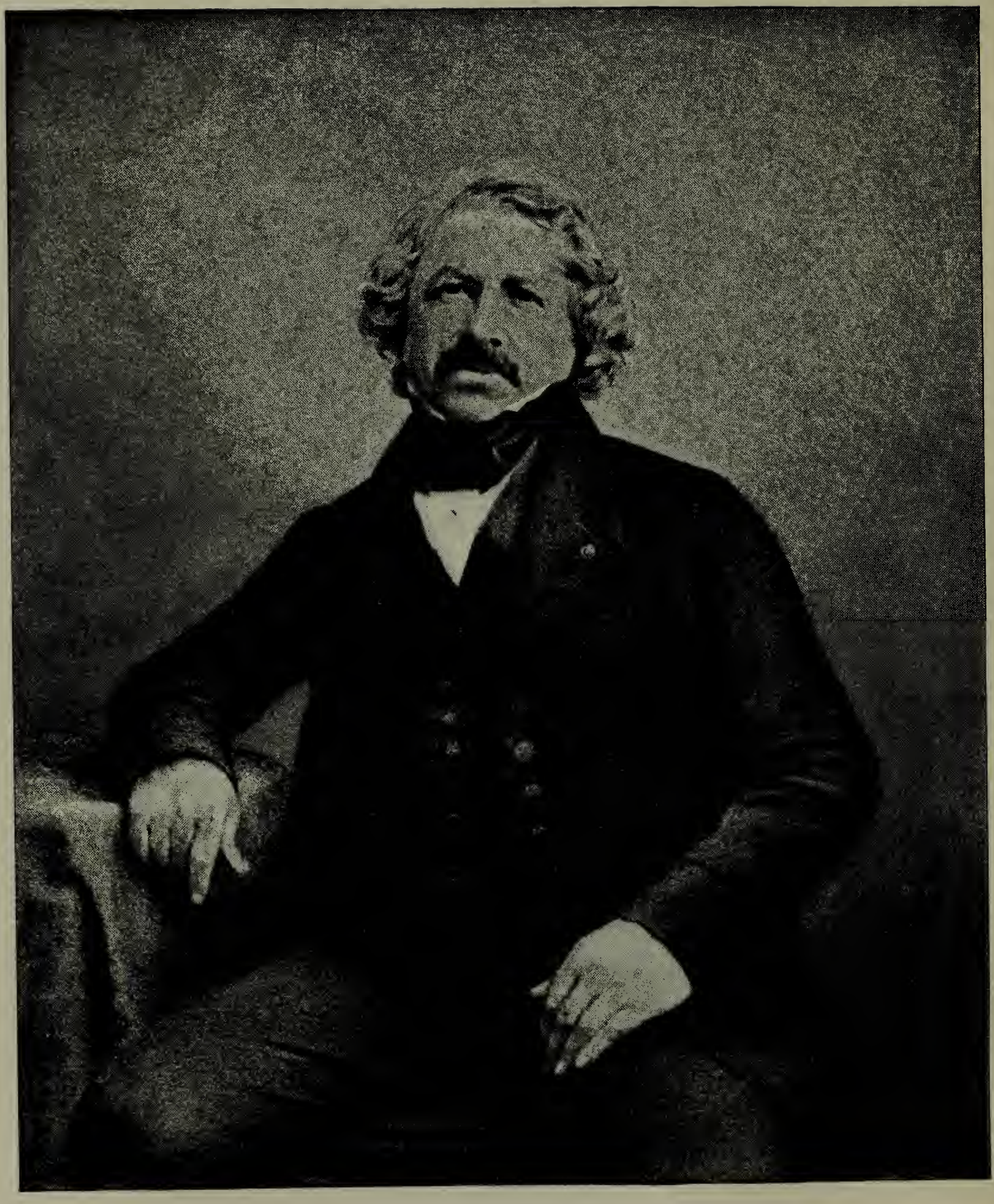
From Carte-de-Visite in the possession of Charles Ehrmann, Esq., New York.
A copy from Mead's Daguerreotype No. 4.



DAGUERRE

From "Crystalotype," by Whipp.e, in *Photographic and Fine Art Journal*, for February, 1855.

A copy from Mead's Daguerreotype No. 5.



DAGUERRE

From "*Paris l'hotographe*," May, 1891.

Copy of a Daguerreotype in the possession of M. Nadar, Paris.

peared in some way at that time. They may even now be lying neglected among some other examples of the old style pictures. Let us hope that the future will bring them to light.

By an oversight, the bust of Daguerre, illustrated on page 35 of the 1891 ANNUAL, was stated to be on the monument at Bry-sur-Marne; this is at Cormeilles-en-Parisis, his birth-place.

The monument at Bry-sur-Marne was erected by the Société Libre des Beaux Arts, of which he was a member, by a subscription, and was inaugurated November 4, 1852.* M. Robault de Fleury was the designer, and the medallion portrait and other sculptures are the work of M. Husson, sculptor. The inscriptions are as follows: Front—Á DAGUERRE LA SOCIETE LIBRE DES BEAUX ARTS. MDCCCLII; Sides—SCIENCES—BEAUX ARTS; DIORAMA—DAGUERREOTYPE; Rear—Le Conseil Municipal de Bry a Louis—Jacques—Mandé Daguerre, né à Cormeilles-en-Parisis, le 18 Novembre, 1787. Décédé á Bry, le 10 Juillet, 1851. Concession de terrain gratuite et perpétuelle par deliberation du 10 Aout, 1851.†

The monument at Cormeilles was erected on August 26, 1883, in a small open square opposite the house where he was born. It consists of a pedestal some six or seven feet in height, surmounted by a bust in bronze, the work of the sculptor Capellari.

I have also come across a cut of the house in which Daguerre lived, 15 Rue de Marais, Paris, which is reproduced here from "Photography for the People," by H. J. Rodgers, Hartford, 1873; the original source I have been unable to ascertain.

C. W. Canfield.

* Fouque, *La Vérité*, etc., 1867, p. 243.

† Arthur Chevalier. Etude sur Charles Chevalier, etc., p. 159; quoted by Fouque, *La Vérité*, etc., p. 244.



MOUNTING.

The first and most important requisite in mounting prints is good paste. This is made by dissolving pure corn starch in cold water in the proportion of 1 drachm of starch to 1 ounce of water, and then cooking it over a gasoline jet or any other convenient source till it just thickens, stirring all the time to keep it from burning. It must not be cooked too much or it will not hold so well. It should be made long enough before the prints are ready to mount for it to become cold. Strain by wringing it through a piece of muslin. If too stiff thin with glycerine to the right consistency. It will keep for a few days by adding a few drops of carbolic acid. It is just as necessary to be particular in making paste as it is in any other photographic work. Success in photography, as in everything else, depends on being particular in little things.

The prints must be mounted while wet on first-class mounts. Every particle of the back of the print must be evenly covered with paste, before it is laid on the mount, and then there will be no peeling up of the corners or blistering in the center while burnishing. A squeegee roller is a good means of bringing the prints into perfect contact with the mounts. If this is not convenient an old-fashioned rolling-pin and some blotters will answer every purpose.

J. R. Swain.

COMBINING PHOTOGRAPHS.

It is a difficult matter, I know, but I will try and write an article worthy of the Annual for 1893. I have chosen a subject which, although not new, will, I think, be found original in its applications. It is combining pictures. A gentleman who had recently lost his wife brought me a tintype picture of her and wished his own to be photographed with it. First, I will explain my apparatus. Formerly I had a $4\frac{1}{4} \times 6\frac{1}{2}$ camera to which, for the purpose of enlarging, I had made sections to the box open at both ends, which would fit together and to the back of the camera, one end of each being the exact size and shape of the plate-holder and the other the size and shape of the back of the camera where the plate-holder was adapted. Thus I could insert one or more of the sections between the plate-holder and back of the camera, extending the box to the desired length for the purpose of copying, the whole being placed upon a board so that the bellows of the camera could be

extended or contracted as desired. This was my apparatus for copying, reducing, or enlarging up to cabinet size for a long time; and when, after obtaining an 8 x 10 portrait camera, I found it still more convenient to use the small plate-holder for cabinet work, I shaped out a board the exact size and shape of the 8 x 10 holder so that it would fit to the 8 x 10 box in place of its own holder. I then cut an opening in the centre of this board large enough to fit into it a six-inch section of my enlarging box before mentioned, to which, of course, the small plate-holder, or more sections of the enlarging box fitted exactly. I could now use my 8 x 10 lens and box and the 4¼ x 6½ holder together for cabinet work. I now cut out a dark colored piece of card board exactly one-half the inside size of the six-inch section of the box now in use, to be inserted in said box in front of the plate when the exposure is made on one-half of the plate. This of course is placed in front of the one-half of the plate which does not receive the exposure, to protect it from being fogged when the other half is exposed. This cardboard can be placed close to the plate or to the distance of six inches, or length of the section. The smaller the stop used in the lens the greater can be the distance from the plate.

Many of these ideas were suggested by A. A. Adee in the ANNUAL for 1892. To make the combined picture, place the cardboard, take the focus and expose the unscreened half of the plate as usual, noting the position of the subject best adapted to combine with the copy or enlargement, then replace the slide in the holder and remove the latter from the camera. Now, convert into a copying camera by additional sections, or use any enlarging camera to photograph on the other half of the plate the picture to be combined with the first, using, of course, the cardboard to screen the half of the plate already exposed.

Four things will have to be determined: 1. The relative size and combining of the pictures, which not only include the figures themselves, but the backgrounds and foregrounds, and lighting where this can be done properly, that is, having both figures lighted from either the right or left side, but this cannot always be done, as was the case with the photo which I send to illustrate this article. 2. The best-sized stop to use in lens for the different exposures. 3. The proper distance to place screens from the plate, and 4. (Very important), To make the different exposures of such duration that they will develop simultaneously.

Frank Woodard.

TONING WITH ALUMINIUM CHLORIDE.

Aluminium, which has become the metal of the period since it has been discovered how it can be produced cheaply, has also been pressed into the service of the photographer. We mount our lenses in aluminium, it has been substituted for brass in the construction of cameras, decreasing thereby very considerably the weight of our apparatus, developing trays have been made of it, and it has been added to the powdered magnesium for the production of an improved flash-light.

Whether or not aluminium or its salts have been heretofore employed in photo-chemical processes I have not learned, and as I employ its chlorides very successfully in the toning of matt-surface and albumenized paper, priority can justly be claimed by me, I think.

The addition of aluminium chloride to the gold salt, is not only a novelty, but it is an important step forward; and, when I describe my method of working to the readers of The American Annual of Photography, I do so to give it the widest possible circulation.

If matt-surface paper is preferred for printing, salt it in a solution of 300 grains ammonium chloride in 1 gallon of water, sensitize with nitrate of silver 1 in 10 and fume, or use a solution of ammonio-nitrate of silver of the same concentration, when fuming can be dispensed with, provided the paper is not of spongy nature, and solid enough to prevent the silver from sinking in. Print somewhat deeper than the desired shade of the finished picture, wash and tone.

To prepare the toning bath dissolve 20 grains of aluminium chloride in 12 ounces of water, and make it decidedly alkaline with bicarbonate of soda; as much as 85 grains seems to be the quantity to produce the best effects. When the solution reacts alkaline, hydrate of aluminium separates in a flocculent gelatinous form. Allow to settle, and filter the solution. Add a sufficient amount of gold chloride, just enough to tone with it a certain number of prints, always keeping in mind, one grain of chloride of gold will tone at the utmost one and a quarter sheet of paper, not more.

Chloride of aluminium in this process is by no means to be considered as a substitute for gold, but an aid; it enhances the beauty of the picture, its brilliancy, depth of color and detail in light and shadow.

Toning should be accomplished in from eight to ten minutes. To judge of the tone attained cannot be determined

by strict rules, but must be left to the experienced eye of the operator. A print not toned enough does not show a visible improvement on the ordinary gold-bath, and over-toning impairs its brilliancy.

As the prints come from the toning bath place them at once into "pickle" (1 gallon of water to 1 ounce salt), which arrests further action of the toning bath and turns the free silver that may be left in the print into a chloride, thereby giving the hypo a chance for free action; you will hardly notice any perceptible change of color of the print upon being transferred to the hypo bath.

A correctly toned print on either matt-surface or albumen paper has a richness and brilliancy not attainable with any of the ordinary gold-baths, no matter how compounded.

John R. Clemons.

IS LIGHTNING INSTANTANEOUS?

One night last summer while watching a display of nature's pyrotechnics, a bat flew directly in front of a very vivid discharge of lightning. Although the latter seemed to consist of a *single* crooked line of light, I distinctly saw about a dozen instantaneous impressions of the bat several inches apart, all having different outlines.

If I had caught the image of this spark on the photographic plate while the camera was fixed upon the tripod, it would doubtless have shown but one wavy line; on the other hand, if the camera had been moved across the path of the discharge, the resulting photograph would have taken the form of a series of parallel ribbons, the inference being that lightning is not instantaneous in its action.

Experience has led me to believe that when an electric path is once opened in space, a series of intermittent instantaneous flashes or impulses follow this line (it being a better conductor than the surrounding atmosphere) until an electrical balance between two points in space is maintained, or the energy of an electrified cloud has been "tapped" by the earth through this conducting channel.

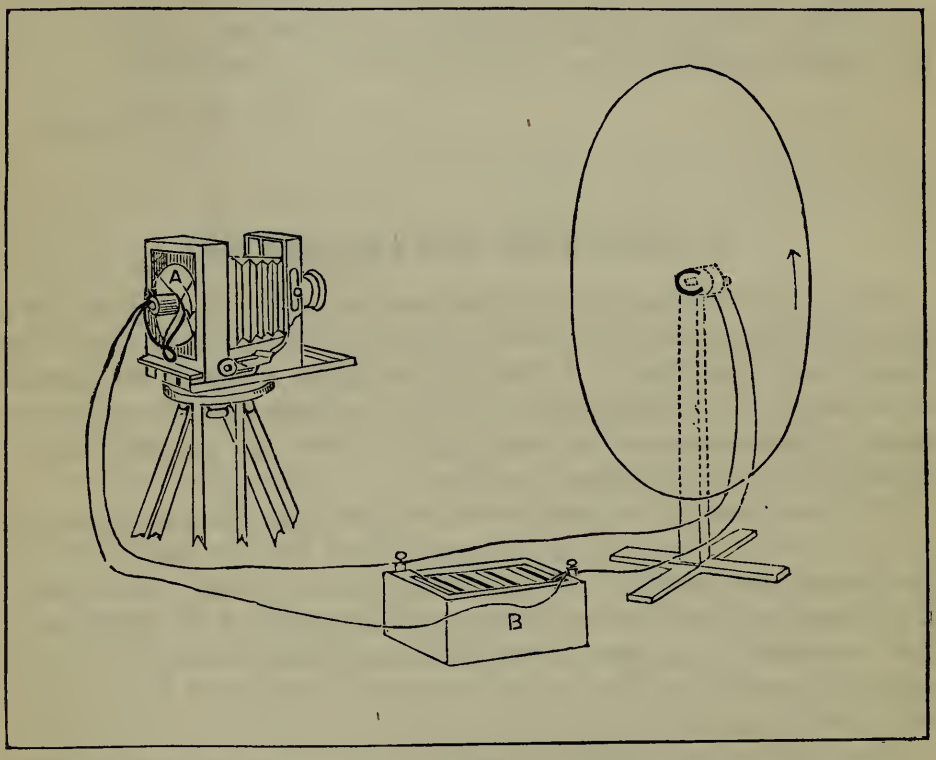
To determine whether such is the case, I have devised a simple piece of apparatus:

Clamped to the back of a camera is an electro-motor, the spindle of which terminates in a rubber cup which holds in

place by atmospheric pressure a circular celluloid negative film (A).

At night during a thunderstorm the camera is set up opposite a window facing the centre of activity. A film negative is attached to the rubber cup (no plate-holder being necessary as the room is in darkness), and the electro-motor revolved at a high rate of speed by means of a battery (B). By the side of this camera is placed another, which will catch the lightning flash in the ordinary way, the plate being rigid during exposure.

Both lenses are uncapped at the same time. As soon as a



strong discharge takes place in the field of view, the two plates are developed at the same time with this result:

If the discharge was in the form of a single instantaneous line of light, its image on both negatives would be the same.

If, however, it consisted of a number of instantaneous flashes following the same path at quick intervals, the surface of the anchored plate would indicate but one discharge, and the spinning plate would contain a series of radiating lines having the same general contour and character.

A large hoop (C), having light bamboo spokes and its sur-

face covered with white mosquito netting, upon being revolved with extreme rapidity a discharge of lightning appears to check its flight, and for some moments the bars of the mosquito netting and the bamboo spokes are plainly visible.

I am looking forward with some interest to the outcome of the following experiment to test the speed of the electric spark:

A celluloid film will be revolved in the camera in one direction and the large hoop in the opposite direction. A photograph of lightning will be made to include the hoop. If it is really an instantaneous single flash, we shall get in addition to the image of the lightning the outlines of the ring and the bars of the mosquito netting clearly and sharply defined. If, on the other hand, time is consumed during the discharge, the result will be a blurred, bent image of Jove's handiwork, without any trace of the netting or spokes of the wheel.

W. N. Jennings.

THE ART OF PHOTOGRAPHING STILL-LIFE.

All inanimate objects may be regarded as legitimate subjects for still-life photography, consequently, in this department the amateur has always opportunities at hand for the prosecution of his studies. This is an immense advantage, particularly to the beginner, as one can always find material enough for still-life studies at home, to make pleasing compositions.

Goethe once said: "It is by the laborious collection of facts that even a poetical view of nature is to be corrected and authenticated." Keep this before you in the field of study you now enter, because it is for the accumulation of an infinity of facts concerning the aspect of material things, with an artistic purpose in view, that the study of still-life is recommended; nothing is too common to aid you in this, and much is full of beauty.

"What a study," what a vista this opens for the amateur photographer, with a little artistic taste. Endeavor to give a human interest to whatever group of articles you may decide to photograph. Incongruous, incoherent collections of things awaken no interest except that which is perhaps excited by the excellence of the detail, or perhaps merely as a photograph, but no composition.

As a mere exercise, or we might call it an experiment for

photography only, such a pell-mell would answer the purpose; but it is well at all times for the amateur photographer to intimate that he has a higher purpose to attain. In arranging a study of several objects, bear in mind this fact then; that to give it a human interest increases its value as a work of art, and not merely a photograph crowded with lots of detail. Of course it is for the photographer to exercise his judgment and taste in regard to the most effective manner of lighting his objects. I find that a side light falling at right angles to the group will prove the most striking for still-life pictures and will give more roundness to objects, and stronger shadows which are quite essential in this branch of photography.

Furthermore, exercise great care in arranging and grouping your subject to be photographed and keep the principal masses together; with this in view the artistic photographer can attain success in this branch of work, with a very little material.

G. J. Stenzel.

HAND CAMERAS.

Every day the number of workers with hand cameras is increasing and the number of hand cameras is quite keeping pace with the number of workers. So far as I have observed the work produced in this way on your side of the water is quite on a level with the best produced in any part of the world; and for this reason it may seem out of place for me to address American readers on this subject. At the same time it is true that we have more difficult conditions of climate and light to contend with, and consequently our experiences ought to be useful to you "over there."

So far as I can judge from the photographic journals which my American friends are good enough to send me, there is not in use in America such a tremendous variety of hand cameras as are found in Britain. Here their name is Legion; we have hand cameras dear and cheap, simple and complex; we have them with and without magazines for the plates; we have them with "fixed" focus and with focusing arrangements; we have them with mere guiding "finders" and with "twin" lenses for finding and focusing. We have in these instruments all kinds of shutters, some in front of, some behind the lens, some close to the plate. In fact, of these cameras there is no end. For a considerable time I have been experimenting

with hand cameras of various kinds, and I venture to give in quite general terms some of the impressions I have got from my work.

I believe the general tendency at present among workers who "know something" is towards simplicity in every part of the apparatus. The young hand is no doubt dazzled and attracted more or less by complicated articles, which from the very multiplicity of their "kicks" seem fitted for work under every possible emergency, but the old stager knows that he will secure better results on the whole by using an instrument over which he has complete and instant control. For my own part I have found that as my experience has enlarged, my tendency has been more and more towards simplicity. The most salient instance of this touches the question of "Magazines" *versus* dark-slides or roll-holders. I have tried a good many patterns of magazine cameras, and I have examined nearly all on our market, and both from theory and from actual practice I am dead against magazines in any shape whatever. Some of the plate-reservoirs or magazines in use in this country seem made on purpose to sell in the first place, and to puzzle and drive mad in the second. I have used more than one expensive magazine camera, and have discarded them all, finally as I believe. Of course a roll-holder is the *beau idéal* of an arrangement for our purpose, and it may be called a magazine, though I here class it as a dark-slide. But suppose roll-holders were not invented, I would use ordinary dark-slides before any magazine or changing-box or bag I have ever seen, not to mention the intricate and in many cases foolish arrangements for automatically changing plates in the camera itself. One of the changing-bags of which I have late experience, had nearly all the possible disadvantages; it frequently stuck, it was a fumbling affair, and it was a perfect dust-trap. Once the dust got in there was no getting it out short of breaking up the whole concern. Failing a roll-holder I propose to confine myself to the "common or garden" dark-slide.

There is litttle doubt that "*on paper*" the only perfect instrument is fitted with either twin lenses for finding and focusing, or with an angled mirror so arranged that the image actually projected by the working lens is focused on a supplementary ground-glass. But in the first place the latter device is vitiated by the fact that the image projected on the ground-glass of the finder through a lens working at even F/8 is dim, and the want of sharpness marked, unless a "first-surface" mirror is used. I have only once seen such a mirror in a

hand camera and that was a home-made one by Major Lysaght, an amateur. In the second place it is found that with a very moderate amount of experience the worker learns to judge the distance with almost unfailing accuracy, and so failures from error of focusing are rare or unknown. Probably no arrangement will be found superior on the whole to the ordinary finder, and a plate or dial marked with distances for focusing. It is important, however, that this plate should be on the top of the camera, and not as usual on the side or bottom.

The release of the shutter is of great importance. Most releases are of such nature and in such position that they require a considerable amount of force to operate them, and that there is grave danger of pushing aside the camera in making the exposure. The majority of the cameras I have used have been marred by this defect. The release should be as easy as possible, and in operating it the finger should either press towards the worker's body, or in a direction towards the thumb of the same hand, as in the trigger of a rifle. I should prefer the trigger action to all others; but have not yet met with it so far as I remember. The thumb might be the acting part, the first finger acting in the opposite direction; my point simply is that the two should act against each other.

A few words as to the best position for the shutter. The theories touching shutters of ordinary types and used in the common positions, in front of, in the middle of, and behind the lens, are so well known that they need not be discussed here. But shutters working close in front of the plate are not so common and their advantages not nearly enough known. Such an arrangement as a blind with a slit in it working close to the plate is very old, having been used by Mr. W. England in the early days of collodion, and by Mr. Edwards later in almost if not quite the form used to-day. The rolled-up blind entails an addition to the camera, if not fixed in the camera from the first; but it gives extremely rapid exposures, and it gives the best "coefficient of light" of all shutters made. That is to say it allows the greatest amount of light-action on the plate during its exposure. With a shutter of this kind, though my experience of it is very short, I have obtained results that I never got before—extremely rapid exposure and the plate developable after it. It is admitted, however, that the rolling blind, as a mere exposing device, apart from its other merits, is a clumsy affair, large, time-consuming and noisy.

In general, I venture to suggest as the lines on which a

hand camera should be made, the following: Absolute simplicity in all parts, no magazines as usually understood, all adjustment devices visible without effort, an easy and steady release, a shutter giving the best coefficient of light, the whole neat but not gaudy, and no attempt at disguise of the real nature of the instrument.

Andrew Pringle.

ON THE PREPARATION OF MATS FOR EXHIBITING PHOTOGRAPHS.

The matting of photographs is similar to the matting of magic-lantern slides, it will either make or mar the finished picture.

Having had some experience in the getting up of original mats (for more than one photograph) for a recent exhibition, and knowing full well the difficulties that present themselves at every turn to the person who is about to do this for the first time, I propose to give the results of our own experience together with some specimen mats.

It should be first clearly understood that it is not claimed that all those given are entirely original, but I think that any one can with the aid of these make a creditable showing at an exhibition.

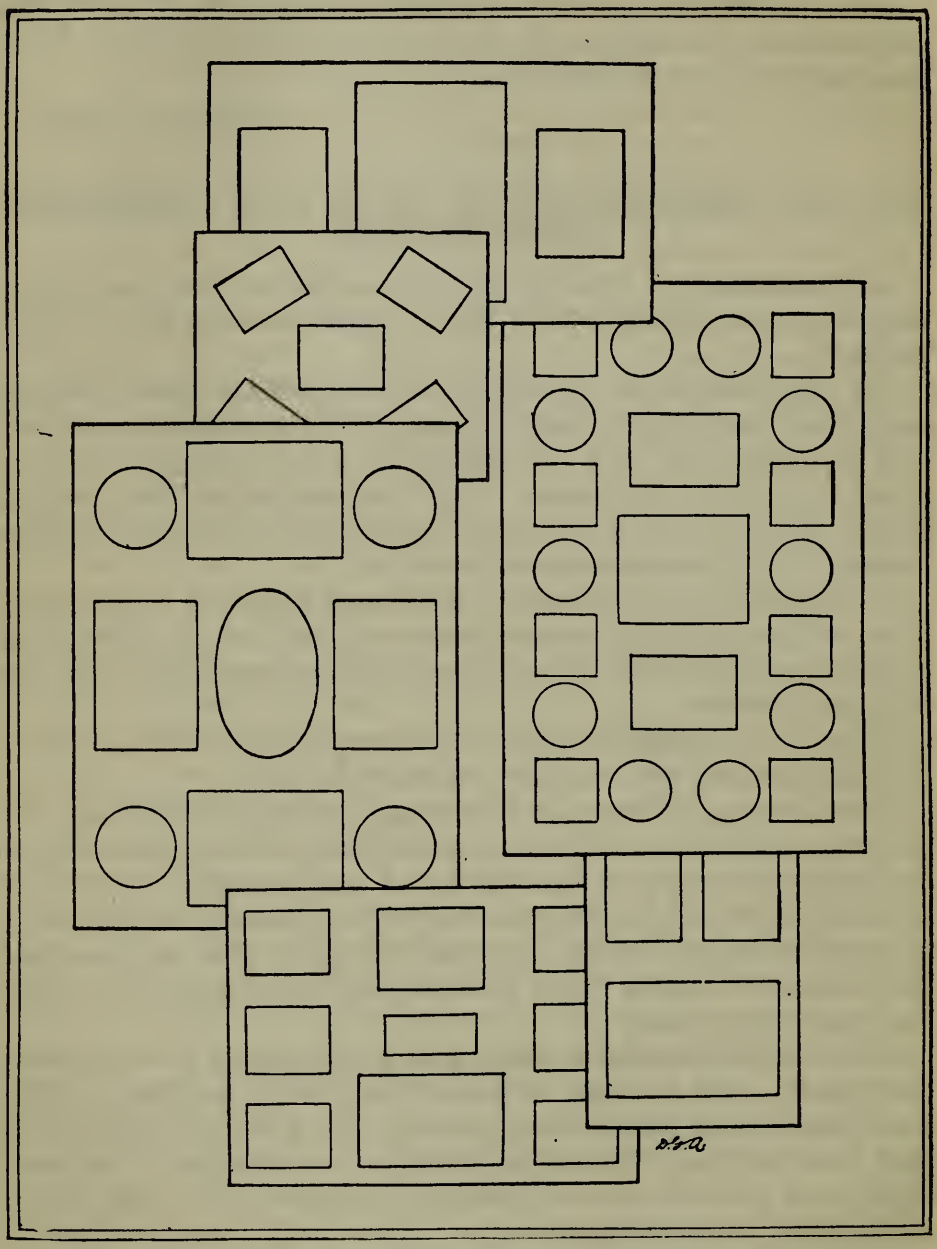
These mats range in price from forty cents to two and one-half dollars, and are in every way satisfactory.

Should you choose any of these, I would recommend the cutting of a piece of white paper the size you wish your mat to be, and pasting upon this pieces of black paper cut the size and shape you wish each opening to be. Paste these precisely where the holes should be; this will give you an excellent idea how it will look when finished, and also serve as a guide for your mat-maker.

One word about the mounting of photographs in connection with mats. Do not tack or paste them to the mat, but get the backboard to fit your frame, remove the glass and place mat and back in place, shoving squarely to one corner; now mark lightly on back-board the openings, remove from the frame and extend lines with a ruler.

Now place the selected photograph beneath mat and adjust the opening, marking the extreme corners with a pin (this will not show when finished), cut down to fit your place, and place on board so that the two upper pin-holes are in a line with the extension of the upper line, also the same with one side,

tack and you will find that it will be in the right spot; do the same with all. Prints should be mounted on thin cardboard without trimming and burnished without rounding.



These designs can be used on plain cardboard by outlining them after the photographs have been mounted. Almost any photograph will be improved by proper handling in this as in other particulars.

David G. Archibald.

THE CONFERENCES ON PHOTOGRAPHY AT THE CONSERVATORY OF ARTS AND TRADES IN PARIS.

The directory of the Conservatory of the Arts and Trades last winter organized a series of conferences on photography, having for their object to show the necessity of a regular teaching of that marvellous art born in France, where it has never ceased to be cultivated with as much éclat as of perseverance.

These conferences had the greatest success, and have served to ascertain this fact, that the French savants and the practitioners are always amongst the most successful inventors; but the progress of photography and of its numerous applications is so rapid in all the civilized countries that, to follow and make the best use of them, it is now indispensable to establish public courses and laboratories of free access to the experimenters.

The names of the lecturers are all very honorably known in the photographic world, and several of them are illustrious. Here is the list of them with the name of the subject treated by each one, and a commentary, necessarily very succinct, which we hope will suffice to give an idea of the great interest which has attended this *review* of science and the photographic arts.

On the 22d of November, 1891, the series of these conferences was inaugurated by an address from Colonel Laussedat and M. A. Davanna, President of the Board of Administration of the French Photographic Society. M. A. Davanne, with a competence and an impartiality, to which every one renders justice, made the *History of Photography and its applications*, entering in technic and even anecdotic details which his personal relations with the inventors and their family rendered most instructive and interesting.

On the 6th of December Mr. Demeny, Chief of the Laboratory of the Physiologic Station, annex to the *Collége de France*, described in the name of his venerated master, the Docteur Marcy, of the Institute, and in his own name, the beautiful studies and splendid experiments, to-day so popular, which constitute a new science, the *chromophotography*, principally applied in the United States and in France.

The interpretation of these experiments, which no other mode of investigation but photography would be capable to realize by imparting to our knowledge the secret of the motion of the most perfect animated beings, as man, the

horse, and that of the most mysterious, as the bird and the insect, has not only a great philosophical interest; it can and must help us to solve the problems until now almost unattainable, that of the aviation, for example.

On the 13th of December, it was the turn of a great inventor, Mr. Lippmann, of the Institute, who it suffices to name to remind all of the scientific and splendid discovery of the *photography of colors*, this time realized in unexpected conditions. With a modesty which becomes great men, Mr. Lippmann ended his beautiful speech by saying that he thought to have only shown the way, hoping that others would remove the difficulties, but he soon did it himself and obtained new results deserving our admiration, which makes us pressage the solution of the problem so eagerly pursued, and which in its actual state is a new triumph for French science.*

On the 20th of December, the President of the French Photographic Society, who is no other than the celebrated Director of the Observatory of Physical Astronomy of Mendon, Mr. Janssen, of the Institute, reviewed the history of astronomical photography, from the first assays of Dr. Draper, in America, to obtain the images of the moon on plates prepared after the manner of Daguerre, to the admirable photographs of that astral body by Warren de la Rue and Rutherfurd, and to those not the least marvellous of the protuberances, and of the glories of the eclipses of the sun, of the spots, the faculas, in a word of all the events which are every day registered in observatories, and, more specially, in that directed in such a remarkable manner by Mr. Janssen. The lecturer did not fail to point out the services rendered by photography to astronomical spectroscopy, of which he has been one of the creators, and which is applied with such great success in America by Prof. Pickering, of Cambridge.

He also particularly insisted upon the *photometric method*, which he himself proposed and applied, adding that the progress of photography permitted to still render it more sensitive.

On the 27th of December, the meeting was devoted to the *photography without a lens* by Captain Colson, who has given the theory of this process and the rules to be followed. In 1886 a first inventor, Mr. Mécheux, had obtained, and it is certainly a great merit, photographic images through a hole bored in a metallic plate, but the diameter of

* *The Times* in its issue of June 22 gave an account of the improvements made by Mr. Lippmann.—EDITOR.

that hole, which replaces the lens, was determinated by groping for a given distance from the image. Captain Colson as scientifically and completely solved the problem, by basing the theory on that of the luminous ondulations and of the interferences, and gave the formula by which are united the two elements in question.

This is a very ingenious and economical means (due to two French inventors) of obtaining an image of very large dimensions and absolutely without deformations. of which we have not yet utilized all the merits.

On the 10th of January, the new series of lectures was inaugurated by the learned Professor, Mr. C. Fabre, of the faculty of Toulouse, well known by the publication of a very remarkable encyclopædia of photography.

The subject treated was the *Chemistry of Photography.* It was somewhat difficult, but the lecturer, who knows it quite well, succeeded in rendering it both instructive and attractive, by drawing a picture of the phases through which photography has passed to perfect its preparations and reach the prodigious rapidity of execution, the instantaneity, of which we make so many uses and of which the lecturer gave an example in making, with the collaboration of Mr. Cousin, a picture of the amphitheatre full of auditors, which he projected before the adjournment of the meeting.

On January 17th, Mr. A. Cornu, of the Institute, with the clearness of exposition which belongs to him and with the authority of his science, made a review of the recent progress of *Celestial Photography*, which, from the brilliant attempts of the brothers Henry, have led the astronomers of every country to answer the call of Admiral Mouchey to make together a map of the heavens. In the course of this lecture, Mr. Cornu showed to the auditors some proofs of that celestial map and of the principal planets, photographed by the brothers Henry; he also projected several proofs obtained by the French astronomers who had charge to observe the transit of Venus on the sun, giving circumstantiated details on the use of the photographic apparatus employed; lastly he reminded us of the means, by him indicated, to use the lenses constructed for the telescopic vision, and how to avoid halos in the luminous parts of certain photographic images.

On January 24th another application, very different but also very useful, *Medical Photography*, was treated by Mr. A. Londe, chief of the photographic department of the

hospital of *La Salpétrière*, to whose ingenuity and science are due most of the preparations for the study of nervous diseases, and in certain cases, the good effects of the treatment employed to cure or to alleviate them. After the physiologic researches explained by Mr. Demeny, the public was acquainted with the great services rendered by photography to pathology and the art of curing.

On the 31st of January, Mr. le Commandant Fribourg, chief of one of the laboratories of the office (*ministère*) of the war, whose lecture has been entitled, *Military Photography and Cartography*, described the results of the attempt, which, after all, has very well succeeded, of the photographing in a balloon, first devised by Nadar in 1858, pursued in America during the war of secession, and which the French aeronauts have continued as much from patriotism as in the interest of science. The Commandant Fribourg, who has himself taken a very active part in all the researches relating to the military applications of photography, afterwards gave very interesting details on the processes to-day employed for reproducing maps and plans; he also discussed the question of the *telephotography* and exhibited remarkable views of buildings and parts of landscapes taken at distances reaching seven kilometres. There are even some which have been obtained at a distance of sixteen kilometres and which show a pretty good sharpness.

At the meeting of the 7th of February, Mr. Léon Vidal, Professor at the National School of the Decorative Arts, made a speech on photo-engraving *in relievo and in intaglio*, on *the photochromography* and on *their applications to the art of the book*. All the erudition of the sympathetic lecturer was necessary to fulfill this programme in less than two hours without omitting any detail and none of the names of the numerous inventors who have contributed to devise the processes of great perfection which have made a revolution in the *art of the book*. Mr. Vidal concluded the explanations he had given on the ingenious invention made simultaneously, in about 1869, by Louis Ducos du Hauron and by Charles Cros, in photography of colors, by making for the first time in France, superimposed projections capable of giving to the images the illusions of color of which Mr. Ives, of Philadelphia, had for some time given the example. These experiments were based on the use of orthochromatic plates

which Mr. Vidal recommends for general use in all photographic operations.

On the 14th of February, Mr. E. Wallon, Professor of Physics to the College Janson-de-Sailly, gave the *history of the photographic lens*, that is to say, the theory of the lenses and the combinations to correct every kind of aberration, spheric, chromatic, the astigmatism, the distortion, to give depth of focus, and that of the field, the uniform lighting of the focal surface, etc. Mr. Wallon, well-posted on the progress in the making of optic glasses and of lenses both in France and abroad, gave excellent advice to constructors and made the most precise and convincing experiments to support his explanations.

On the 21st of February, Mr. E. Trulat, Director of the Museum of Toulouse, spoke on the vast subject of *the recording of natural phenomena by means of pho'ography*. This title, in fact, includes so many things that one should refrain from enumerating them all, and so the savant lecturer was obliged to select, first, among the registering apparatus based on photography, then among the multitudes of the materials accumulated by the meteorologists, the physicians, the geologists and naturalists; images of clouds, of lightnings, of tornadoes even, of the glaciers and the great geological phenomena, tumbling down of mountains, geysers, eruptions of volcanoes, etc., etc., which photography can alone exactly preserve to permit their study a long time after they have occurred.

On February 28th, Colonel Laussedat explained the methods of *iconometry* and of *metrophotography* (also *photogrammetry* and *topophotography*). It reminded us and demonstrated that iconometry is very old, but that it received a new and decisive impulsion from the French hydrographic engineer, Beautemps-Beaupré, in 1792. The lecturer showed afterwards how, since 1850, he has improved this method by first using the *clear camera of Wollaston* transformed into an apparatus of precision, and, lastly, by applying it to photographic views obtained with an apparatus provided with geodosical organs, and which to-day is everywhere designed under the name of *phototheodolite*. The principal results obtained by Colonel Laussedat from 1850 to 1860, and those of his collaborator, Mr. le Commandant Javary, from 1863 to 1871, were exhibited to the auditors.

Microphotography was the subject of the conference of March the 6th. Mr. L. Duchesne, member of the French Society, gave a review of the powerful and delicate apparatus necessary to obtain the marvellous images which divulge to us the structure, so unexpected, of the microscopic organism, and the processes as varied as ingenious that the microphotographer had to discover to solve the difficult problems of an art which requires all the resources of optics. The lecturer demonstrated by a great number of examples how useful it was to cultivate that branch of photography for the progress of the natural and medical sciences.

On the 13th of March, Mr. le Commandant Moëssard, member of the General Staff of the Army, made an address on *the panoramic apparatus* and on the *photographic panoramas*, of which he has carefully studied the properties. Very interesting details were illustrated by numerous projections, one of which by means of several combined apparatus on a screen of 8 metres of development, greatly interested the spectators. Mr. Moëssard also exhibited an apparatus of his invention which he names *tourniquet* to determinate the focal distance, and to study the other qualities of the photographic lenses.

At the meeting of March 20th, Mr. Henry Becquerel, of the Institute, gave a description of *heliochromy* and of the chemical actions of light, comprising the account of the beautiful researches of his father, Edmond Becquerel, whom French Science has recently lost. Mr. H. Becquerel reminded us that his father was the first to obtain the photograph of the colors of the spectrum, and he exhibited the very old proofs which still are very brilliant, but which should be kept sheltered from a strong light. He continued his lectures by repeating the experiments of his father on phosphorescence and the chemical actions of light, which have shown the way to so many other inventors.

On the 27th of March, Mr. Charles Gravier, Principal Inspector of the West R. R. Company, gave a very good account of *the usual processes of photography and of their applications.* The learned lecturer, who, it may be said, is an apostle of the photographic science, went over his programme with such a care and method that the less prepared of the auditors were fully informed on leaving the meeting. Mr. Gravier projected numerous views of laboratories and of photographic studios, and veritable panoplies of apparatus, material and utensils of the vast industry and profession which every day acquires a greater importance.



Strauss, St. Louis, Photo.

Crosscup & West Engraving Co., Engravers.

TEACHER AND PUPIL.

On the 5th of April Mr. G. Balagny, President of the Society of Photographic Studies, treated the subject of *Photographic Pellicles and their Applications to Mechanical Impressions.* It may seem that by the simple title of the lecture the subject did not allow very long explanations. Mr. Balagny, to the surprise of the public, of which he captivated the attention during about two hours, demonstrated the great importance of the processes, which consist in substituting thin and resisting surfaces to plates of metal, and especially of glass, as supports for the sensitive preparations. He reviewed all the attempts made since the origin of photography by Fox Talbot, in England, and by Le Gray, in France, till the gelatino-bromide pellicles now so well prepared, in following his indications, by the firm Lumière, of Lyon. The demonstration, with the aid of projections, quite interesting and well made, was very complete.

On April 10th, a learned professor of physics, who is also a skilful investigator and a publicist well known by every one who cultivates photography, Mr. A. Buguet, came from La Flèche, to close the series of conferences for the winter of 1891–1892, by treating of *Photographic Physics.* We could not make in a few lines the analysis of this conference, which was a true and very instructive lesson, in which Mr. Buguet endeavored to define the units used in photography and to indicate the best means to fix them and to find them again. He specially examined the unit and the stallion of light, beginning by the works of Mr. Violle, whose name is allied to this important question, and resumed the resolutions adopted by the International Photographic Congress of Paris in 1889, and of Brussels in 1891, in which he himself took a prominent part.

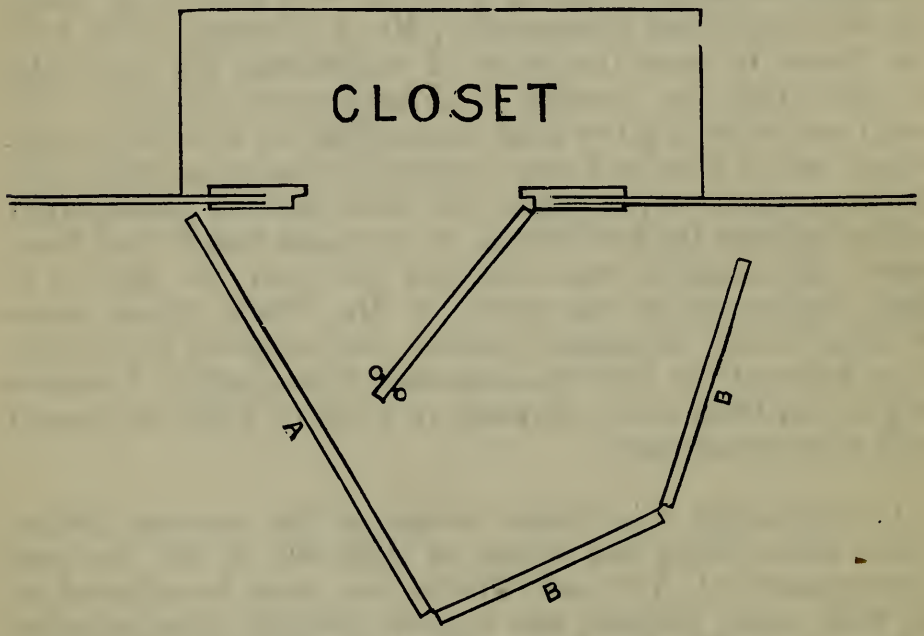
In concluding this *compte rendu* of the nineteen conferences held during the winter of 1891–92, at the National Conservatory of Arts and Trades, we must be allowed to say that never, perhaps, was a more complete demonstration of the utility and necessity of a scientific course of photography and its applications made. The affluence of a choice public, and even of official persons who, without doubt, came to show the interest which the government of the Republic takes in the progress of an art now so universal and so profitable, is a sure guarantee that these conferences will soon be transformed into regular courses. The Club of the Booksellers of Paris, the French Society of Photography,

and, very recently, the Congress of the Photographic Societies of France, have passed the vote that a first professorship and a laboratory of researches be founded at the National Conservatory of Arts and Trades.

Colonel A. Laussedat,
Director of the Conservatory of Arts and Trades.

DARK-ROOM TEMPERATURE.

"Why can't I get as fine a negative as Harry does?" This question was put to me one warm evening in June, by a young friend who had just emerged from his dark-room (a hall closet) out of patience and wiping the beads of perspiration from his face. He was the picture of despair. I laughed in spite of myself, but promised to help him. We then proceeded to his dark-room as above-mentioned, the closet, and



opening the door I at once surmised the difficulty, for the blast of hot air that came out was something stifling.

At a glance the closet appeared about 2 x 4, and perhaps 10 feet high. In it were two shelves covered with trays and other developing paraphernalia, and a "Multum in Parvo" lamp, burning at its highest capacity. With the thermometer I ascertained the temperature to be 98 degrees. I think his question needs no further answering, for we all know that with

plates of high sensitometer, and the late improvements in developers, etc., temperature means a great deal. About 70 degrees is perhaps the best temperature for a dark-room in order to secure good work and not produce bad results on both plate and manipulator. But how are we to do it? Most houses are not built with photographic dark rooms, but a closet can easily be made into a comfortable one with plenty of air, and without much cost.

I found the following plan to work admirably. Make a frame of wood just the height of the closet door and twice as wide; also two others the exact size of door, hinge all three together with the two smaller ones at one end, cover them all with black cloth, being careful to have laps over the joints where hinges are, and stand this large screen before your door, as per accompanying drawing, cover the top with curtain of same material, which curtain you can readily adjust with a few tacks and rings to the top of the door-casing. By this method you can have all the air you want, and not blame poor results to the fault of plates or developers when the thermometer explains the cause.

George E. Merry.

AN ECONOMICAL FLASHING LAMP.

I HAD promised a medical friend of mine to take a photograph of the interior of his surgery. He was a young man just starting out in practice and was very proud of a new operating chair which had been presented to him by his father. But when I went to look at the new surgery I found that the light came from one window only, and that would of necessity be directly opposite the camera. I tried such expedients as hanging a sheet outside the window, and all the dodges I had heard of to prevent halation, but the results were by no means satisfactory. And so it came that I determined to try a flash-light. I did try it and succeeded beyond my expectations. I made my own lamp, too. Just what it cost I cannot remember now, because I had all the rubber tubing I required. This much I do remember, however—the two clay pipes I used cost one cent. Here is the way I rigged up my lamp. I took two common T. D. clay pipes and put about three feet of rubber tubing on the stem of each. The free ends of the tubing were next stretched over the ear pieces of a binaural stethescope borrowed from the doctor. Then I wound some pieces of cotton round the pipe-bowls and my flash-lamp was ready.

The camera, of course, was set in position, the lens being a rapid rectilinear, with largest stop, or full aperture. When everything was ready, the cotton surrounding the pipe-bowls was saturated with alcohol and a charge of magnesium poured into each. Then a match was applied to the cotton, and standing back of the camera, one pipe was held about three feet from the floor and the other at the full extent of the other arm some three feet higher. With the large end of the stethescope between my lips I gave a sudden puff. There was a flash, one hand was slightly singed through my own carelessness, and then the lens was capped. That negative, when developed, turned out to be one of the best interiors I have—no heavy shadows, really an almost perfect picture. It is not necessary to always invest in the latest novelties in brass and nickel to obtain good results. A little ingenuity will save many a dollar.

W. W. Fox.

HOW TO MAKE STEREOSCOPIC VIEWS FROM ANY SIZED PRINTS.

Few photographers are aware, perhaps, that excellent stereoscopic views can be made from any of their prints. Such is the case, however, and the writer has among his large collection of pictures many fine stereoscopic views made from 4 x 5 and 5 x 8 prints. From nearly every picture that the photographer secures, can be cut a sterio. view or two.

First procure some stereo. card mounts, size 4 x 7. Then (for example) make two prints either in blue, aristo, or albumen, from a 5 x 8 negative that has enough interest in it to make two stereoscopic views, and then trim them. Decide which portion of the print you wish to use for the first view, and by means of a measure and pencil, mark off the length and width of the view, remembering not to get it too large to go on half of the card-mount. After four pencil lines have been drawn, the view can be cut out with a pair of scissors by following the lines. Lay this view on the other 5 x 8 print, and after fitting it exactly, which can easily be done after a little practice, mark the uncut print with the scissors point at all four corners, and then draw lines with the ruler, and cut the view out. Now you have two small views which should be exactly alike. Put one on top of the other, and by lifting the sides and top, see if they fit exactly. If not, arrange them straight, and then trim the projecting sides, top or bottom, while holding them firmly

with the fingers. Lay them on the card-mount and see that they fit properly. If everything is all right, mount them side by side, and you will be surprised to see what a fine stereoscopic view you have. You still have the remainder of the two prints left, from which you can make another stereo. view. Of course the two prints can be made so large that they will take up the entire card, and in some instances it is necessary to do this. But it is better to have at least an eighth of an inch of margin all around.

In nearly every negative a certain portion can be found that will make an interesting stereoscopic view. In exposing my plates I very seldom take into consideration the possibility of a stereo. picture (unless it be with my 4 x 5 hand camera), but after a print is made from the negative, I can readily see whether any portion of it will make a stereoscopic view or not. Negatives made with a hand camera nearly always make good pictures from which to produce stereo. views, as they generally show animated life. The very poorest or weakest print, when made into a stereo. view, shows up with remarkable clearness.

During the long winter nights stereo. view-making, as above described, will be found very pleasing and profitable pastime. The writer urges every photographer to try this plan, and see what beautiful results they can obtain.

Geo. C. Rhoderick, Jr.

THE ADDITION OF SILVER IODIDE TO EMULSIONS.

The use of iodide of silver in the collodion process very naturally suggested its employment in dry-plates by the gelatine emulsion process, but the conditions of admixture in the two processes are quite different, as are also the results. Iodide of silver is much more difficult to reduce by developing agents than silver bromide, and when used alone gives extremely weak and thin pictures. The action of silver iodide both in the spectrum and in ordinary photographic work is much influenced by the manner in which it is incorporated in the emulsion. If we prepare an iodide of silver emulsion and a bromide of silver emulsion and mix them after washing, the resulting bromo-iodide emulsion is less sensitive than a pure bromide of silver emulsion; and especially so to red and yellow light, so that one can prolong the exposure without danger of solarization and also use more light during develop-

ment. The plate works clearer, there is less danger of fog, but the resulting negative is less dense.

A plate containing a large percentage of iodide of silver fixes very slowly, and if the fixing bath has been much used a whitish fog ensues which quickly disappears in a fresh fixing solution. When these mixed emulsions are subjected to heat the sensitiveness increases, but at the present time such emulsions are rarely used except for experimental work. The practical method consists in mixing a solution of silver nitrate to a gelatine solution containing potassium or ammonium bromide with potassium iodide. In this case the iodide of silver is at once formed, and it is probable that a double salt, the bromo-iodide of silver, is formed; however this may be, it is certainly true that the bromo-iodide of silver thus formed possesses properties quite different from the mixture of a separately formed iodide of silver emulsion with a bromide of silver emulsion.

A bromo-iodide emulsion when sufficiently digested is more sensitive to artificial and natural light than a pure bromide emulsion.

The proportion of silver iodide varies from 1 to 10 per cent. The latter proportion is seldom found in commercial plates. For landscapes a 3 per cent. iodide of silver gives much better results than a pure bromide of silver emulsion. The details are more sharply defined and the halo less evident. As a rule a small percentage of silver iodide in the emulsion gives more latitude in exposure, but if the percentage is excessive the development is prolonged, the high-lights are deficient in contrast, in power and in brilliancy.

Iodide of silver prevents fog in the emulsion and permits of greater time in digestion than a simple bromide emulsion. This is true of both ammonio-nitrate and cooked emulsions. In ammonio-nitrate emulsions 2 or 3 per cent. will keep off fog; but more than 5 per cent. produces thinness and want of contrast; 10 per cent. is quite sure to give very thin and flat pictures, but as this large percentage permits of digestion at 50 deg. to 60 deg. C., very sensitive emulsions can thus be obtained.

For the method by boiling, a small percentage, 2 to 3, gives good results. In emulsions by the cold method according to Henderson an excess over 2 per cent. is injurious.

As to the best method of adding the iodide salt in making a bromo-iodide emulsion authorities differ. The one in most general use is to add the iodide of potassium to the bromide salt

in a gelatine solution, and add to this the silver solution. Abney at one time recommended adding the iodide salt, after making the emulsion with the bromide salt, but an emulsion thus prepared takes a much longer time to digest than when the whole of the iodide salt is added in the beginning of the emulsification. This may be explained by the fact that when iodide of potassium is added to a mixed bromide of silver emulsion containing an excess of potassium bromide, the formation of iodide of silver goes on very slowly, and at the expiration of thirty minutes cooking at 210 deg. F. there still remains quite a quantity of potassium iodide which has not been converted and which delays materially the ripening of the emulsion.

R. E. Van Gieson, M.D.

ON THE OPTICS OF THE TELEPHOTOGRAPHIC LENS.

The especial conditions to be fulfilled by a lens for photographing inaccessible objects are these:

(*a*) It must be so compact as to be conveniently carried.

(*b*) It should be well corrected for spherical aberration so that it may be used with full aperture, since the light intensity on the ground-glass will always be diminished in at least the ratio of enlargement.

Lenses which satisfy the first condition perfectly, and the second very well, are already on the market. But just how a camera with, say, fifteen inches draw, can be used with a lens of, say, sixty inches equivalent focal length, is quite a puzzle to many amateurs and to not a few of the profession. In the following solution of the puzzle, space forbids us to do much more than present a brief summary of those definitions and optical laws which are essential for clear ideas regarding this lens.

In studying the performances of lenses in general, it has not been customary, since the time of Gauss, to consider the actual path of the ray in the glass. The modern and more elegant method is to determine experimentally all the optical properties of the lens, or combination, without any knowledge whatever of its form or material. Just what is meant by this will be clear from the sequel.

Everybody is familiar with the fact that a convergent lens lens will give an *inverted* image of the same size as the object, when the object is placed at the proper distance. But, in addition to this, all lenses possess the following remarkable

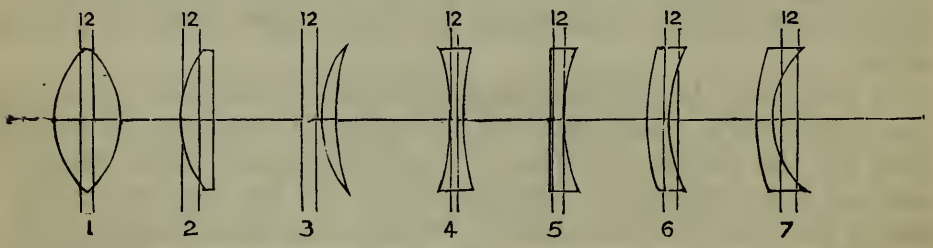
property, viz., there are two planes perpendicular to the optical axis, and such that an object placed in one of them will give rise to an *erect* image of the *same* size in the other. The two planes thus defined are known as the *principal planes* of the lens or system of lenses; and the points in which the optical axis passes through these two planes are called the *principal points.*

These two points are of the utmost importance because of the great simplification which they introduce into the rigid treatment of lenses. By using them as zero points (origins) from which to measure distances, the strictly accurate expressions for focal length and magnification assume the simple forms of the approximate formulas usually given in the text-books.

It is customary to imagine the source of light to the left. The principal plane in which the luminous object is supposed to lie is the *first* principal plane: the one in which the image is formed is then the *second.* Distances are positive, as usual, when measured from left to right; negative, when measured from right to left.

The *equivalent focal length* of a lens, or system, is then simply the distance of the first principal focus behind the first principal point, or, what is the same thing, the distance of the second principal focus in front of the second principal point. It is evident, therefore, that the second principal point is what is ordinarily known as "focal centre."

We shall next give the positions of the principal planes for a short series of typical forms of lenses. The somewhat unique position occupied by the telephotographic lens will then be clear.



FIGS. 1–7.

1. In the *double convex* these planes both lie within the bounding surfaces of the lens, as shown in fig. 1. They are symmetrically placed between the two surfaces only when the radii of curvature are equal.

2. In the *plano-convex*, one plane is always tangent to the curved surface, and the other lies within the material of the lens. In the particular case in which the light is incident on the plane surface it will be seen that the "equivalent focus" and the "back focus" are exactly equal. See fig. 2. It is true in general that, as the relative curvature of the two faces changes, the principal planes are displaced toward the side of greater curvature, *i.e.* toward the side having the smaller radius of curvature.

3. In the *collective meniscus*, we are, therefore, prepared to find sometimes one, sometimes both of the principal planes outside the lens, depending upon the curvature and the thickness. Fig. 3 represents one of these cases.

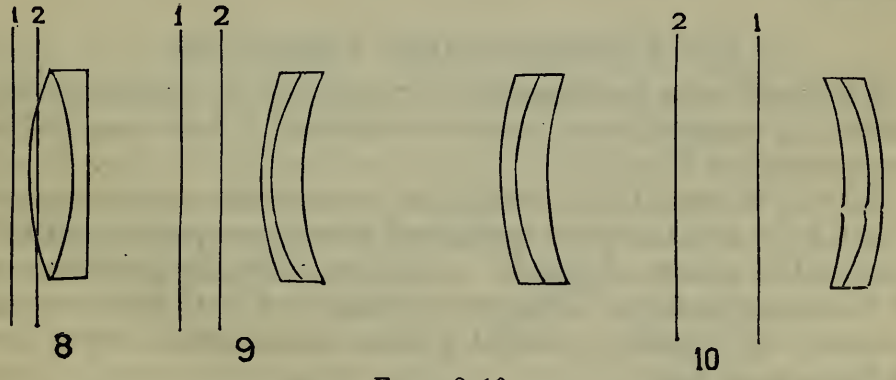
4. *Double concave* lenses. Here again both planes are within the lens, as shown in fig. 4.

5. *Plano-concave.* One plane is always tangent to the curved surface; so that in this case also we have the "equivalent focus" equal to the "back focus" whenever the light is incident on the plane surface. See fig. 5.

6. In this case of the *dispersive meniscus*, the planes are, as before, thrust toward the side of greater curvature, so that one or both may lie entirely outside. These two cases are represented in figs. 6 and 7 respectively.

Combination of Lenses.

The elegance of the Gaussian method is nowhere so evident as in the treatment of *systems* of lenses. By measuring all distances from the principal points, one can compute the optical



Figs. 8–10.

properties of a combination by the use of the same simple expressions which he has already used for single lenses, with this difference only, *viz* : that the *thickness* of the single lens is re-

placed by the distance from the second principal point of the first element to the first principal point of the second element. In other words, the thickness of a combination is equivalent to the distance between its optically-adjacent principal planes. To put it in still another way, the bounding surfaces of each single lens are replaced by the principal planes of that lens.

In the *ordinary single achromatic* lens, such as is often used for landscape work, one which is made up of a dispersive and collective element cemented, the principal points usually fall very near the outer surface of the crown, as in fig. 8.

This is not the case, however, with the two achromatic lenses which are combined to produced the *typical rectilinear doublet.* Here the principal planes lie well without the material of the lens on the side which is more convex. See fig. 9. When now these two achromatics are combined into a doublet, we find considerable variety in the positions of the resultant planes, corresponding to a variety of distances used to separate the front and back elements.

Generally the two planes are found to fall between the two compound lenses which go to make up the rectilinear system. Frequently when the front and back lenses are a little farther separated from one another, the principal planes are "crossed," so that, in following the direction of the ray through the system, one first meets the *second* principal plane; later, he passes the *first.* This state of affairs is represented in fig. 10. Still farther separation of the elements will thrust one or both the Gaussian planes entirely outside the system.

If the system is a symmetric one, both planes go out together.

The Telephotographic Combination.

This particular combination is made up of a negative element, *B*, adapted to a positive element, *A*, and arranged as represented in Fig. 11.

As will be seen, this is simply an asymmetric combination in which both focal centres (principal points) are pushed entirely outside the system of lenses. And herein lies the great beauty of the arrangement. The ground-glass and both elements are bunched up together, while the focal centre stands away out in front in mid-air.

Optically speaking, the system is equivalent to an exaggerated form of the collective meniscus, fig. 3, with the convex side towards the light. The essential feature is *not* alone the great distance of the focal centre in front of the camera, but

also the exceedingly small "back focus." The compactness of the instrument results from both these features.

To describe the method by which the Gaussian planes have been located in the preceding cases would lead us too far. But the following expressions will be found very useful to those

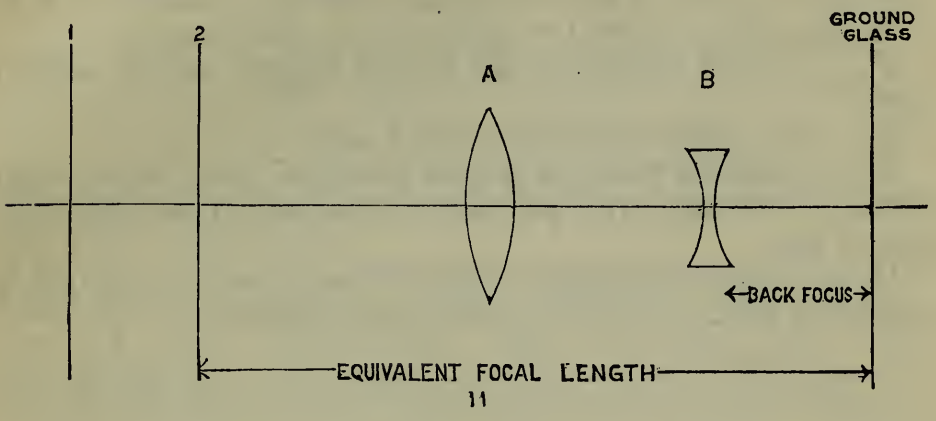


FIG. 11.

who wish to make up a lens of this kind for themselves and want to know where to place the concave element, or what focal length to employ, in order to obtain any required magnification,

The equivalent focal length, F, of *any* combination is determined by the following equation:

$$F = -\frac{F_1 F_2}{D} \quad \ldots\ldots\ldots\ldots\ldots Eq.\ (1)$$

where F_1 and F_2 are the respective true focal lengths of the separate elements, and D is the distance from the second principal focus of the first lens to the first principal focus of the second lens. D is positive when the lenses are separated by a distance greater than the sum of the focal lengths F_1 and F_2; but D is negative when the separation is less than this sum. As noted above, the *separation* of lenses always means the distance between their optically adjacent principal planes.

It only remains to find the *position* of the focal centre, or what amounts to the same thing, to find the required position of the ground-glass, with reference to some fixed point in the lens, so that one can tell what draw of camera will be necessary for any given combination, or what combination can be used with any given draw of camera. The distance from the

back surface to the second principal point (focal centre) of the combination let us call C; then,

$$C = F_2 \frac{W}{D} + F_{2\,s} \frac{T_2}{D_2} \quad \text{.....Eq. (2)}$$

Where F_2 and D have the same meanings as above, and W is the separation of the two lenses of the combination.

$F_{2\,s}$ = focal length of the second *surface* of the second lens.

T_2 = the thickness of the second lens.

D_2 = distance from the second principal focus of the first surface to the first principal focus of the second surface of the second lens.

In the telephotographic lens, the last term in *Eq.* (2) is negligibly small, so that in practice one writes

$$C = \frac{F_2\, W}{D} \quad \text{.....Eq. (3)}$$

C is simply the quantity which must be added to the "back focus" to obtain the true focal length.

We have also

$$D = W - F_1 - F_2 \quad \text{.....Eq. (4)}$$

A single numerical example will illustrate the usefulness of these expressions.

One has a landscape lens of, say, 8-in. focus, which he wishes to transform into a telephotographic lens by the addition of a double concave of 2-in. focus.

Suppose a magnification four times as great as that of the single front lens is required. Where must the double-concave be placed? The scale being four times as large the equivalent focal length of the combination must be 32 inches.

Hence, *Eq.* (1),

$$32 = -\frac{(+8)(-2)}{D}$$

$$\therefore \quad D = +\tfrac{1}{2}$$

But, *Eq.* (4),

$$+\frac{1}{2} = W - 8 + 2$$

$$\therefore \quad W = +6\tfrac{1}{2}$$

The two lenses must, therefore, be placed $6\frac{1}{2}$ inches apart.

But suppose the negative element *is* placed at 6½ in. behind the positive, where will the focal centre of the combination lie and where must the ground-glass be placed?

For this we have *Eq.* (3).

$$C = \frac{F_2 W}{D} = \frac{(-2)(+6\frac{1}{2})}{+\frac{1}{2}} = -26 \text{ inches.}$$

That is, the "back focus" is 26 inches *shorter* than the true focal length; in other words, the focal centre lies 26 inches in front of the back lens. The ground-glass must accordingly be set at [32 — 26 =] 6 inches behind the negative element. The draw of camera demanded by this arrangement is then [6½ + 6 =] 12½ inches.

By use of the same equations one might find of just what focal length the double concave ought to be in order to product any given magnification with any given draw. The reader will find for himself still other useful applications. The more accurate forms of the equations will not always be found necessary in practice; but they are always useful for clear thinking.

Henry Crew.

CONSCIENTIOUS PHOTOGRAPHY.

The sincere and enthusiastic man in photography has an aim in his work beyond the sum he receives in compensation. To have made a very marked success in an important case, as a fine head of a lovely lady, a beautiful child, or a "grand old man," where the happy chances of photography seemed *all in*, and some evidence of art knowledge, judgment and taste were embodied with it, and the result of all could stand as a noble work, the maker of it finds a pleasure and gratification understood only by himself. He can look at his achievement and admire. He does, in a modest, quiet way, feel proud.

He finds pleasure in occasionally turning to it—even when occupied with other work he must take a new look and again admit that it is really good. That which lives in his nature to recognize and admire, smiles approval and gives him a sense of happiness. He would find pleasure in such a work by the hands of another man, and would speak louder in its praise; for the man of real worth is more modest of self-laudation than in according full justice to another. This achievement holds good as a pleasure giver for quite a number of days; he

contemplates it in his mind, and always with the same sense of pleasure, during his absence of a week from business.

On his return he renews acquaintance with it. While he is still enthusiastic, he examines now more critically, he weighs and measures it. He finds in his best judgment that a narrowing of the light would have given a gain in rotundity and a little more curve in the sweep of neck line would have been an advantage.

These points, after careful consideration amount to a flaw in his gem, and he can never find as much pleasure in it as at first, but in the flaw is a lesson—the lesson that by shortcomings or mistakes, knowledge is gained. The discontent growing out of imperfections is a prod to new exertion—*to progress.* And pity to the man who finds his work faultless. When he has reached perfection there is nothing more for him. His career is ended.

The man who stops will soon see others pass him, and to keep to the front he must hold his pace. When not advancing he is retrograding.

Eternal vigilance is the price of high-grade work. Thus discontent and skepticism are necessary to progress.

J. F. Ryder.

ARTISTIC BOOK COVERS FOR PHOTOGRAPHS.

The amateur who takes his first collection to the binder, expecting to choose from numerous samples of artistic bindings a suitable cover for his book, is surprised at the limited variety of styles offered for selection.

He has the option of making it into an ordinary book, or of going to the expense of sending abroad for suitable shades of leather and cloth. He can add to the cost by having electrotypes especially designed to conform with the character of the work, or dispense entirely with the services of the binder, by using portfolios. There is an objection, however, to this way of assembling pictures; one is apt to give away a print now and then, and a collection once depleted generally remains so.

A method of making covers and title pages which are inexpensive as well as being original and artistic is illustrated by the two cuts.

Number one is entitled "Wayside Fancies." After selecting the view, a rock to inscribe a title upon was taken from the stone wall and placed in the foreground. The letters were painted in with opaque water-color after the negative had dried.


Springtime


WAYSIDE FARMS

Snap-shots



at animals

Number two is treated quite differently. A spray of apple blossoms was photographed on the tree with a gray cloth for a background and the negative enlarged as a suitable cover for a series of spring-time pictures.

A unique photograph made by the writer for a cover is that of a young lady standing upon the seashore; with the point of her parasol she has written on the sand the title and date of a collection of photographs and is finishing the last letter.

Bromide enlargements or blue prints can be made from the negative, care being taken to have the paper large enough to turn over and under the card-board cover without cutting the picture.

Enlargements even from small negatives give excellent results as much of the detail is done away with and an indistinct or sketchy look given to the reproduction.

Whether one's hobby be figure, animal, landscape, marine or still-life photography, appropriate subjects will constantly suggest themselves, and those who try this method will be surprised to find what a number of varied and beautiful effects can be produced.

R. Eickemeyer, Jr.

HINTS FOR PHOTOGRAPHIC TRAVELLERS.

The writer has frequently been impressed with the difficulty encountered by amateurs in securing a convenient dark-room in which to change and develop plates while travelling. They seem like a helpless barge drifting at sea when deprived of the conveniences of a dark-room. It is for the benefit of these art travellers and the inexperienced that the following suggestions are offered:

When one is once familiar with the construction of the plate-holder and the method of packing plates, the operation of changing plates by the sense of touch without the aid of vision becomes comparatively easy. Remember that plates are packed in pairs with the sensitive surfaces opposed, and that the first plate of a new box is always placed with the sensitive surface down. When occasion demands we may improvise a changing box out of a coat or lady's jacket by placing the holders and plates within the garment, buttoning it up and folding the collar forward upon the breast. Then fold the bottom of the garment over and securely pin to the collar. To make it doubly safe pin the focusing cloth over the whole; now place the improvised changing box upon the lap in such

a position that the front or folds of the garment will be down, pass the hands through the sleeves and proceed to change your plates without fear. Return the exposed plates to the box in place of those removed.

The writer has most successfully changed plates in the shade of a friendly tree on a clear sunny day as follows:

A dark shawl was folded in such a manner that it was a little wider than twice the length of the plate-holders. The plates and holders were then loosely wrapped in the shawl and a rubber band was placed around each of the open ends. By passing the hands through the bands to the holders and plates in the centre, the plates were successfully changed.

When in our room we may place the plates and holders within the bed and on bended knees proceed to change the plates. There is always danger of light creeping in around our arms, but this may be prevented by pinning an open coat over the front of the bed in such a position that the arm-holes will come even with the front edge of the bed. Pass the arms through the sleeves and proceed as before.

The plates may be developed in our rooms at night. For this purpose we should provide ourselves with the following articles: One dozen thumb-tacks to fasten focusing cloths, etc., over transoms and windows to keep out the rays of electric lights, which is one of the worst Goliaths the amateur has to stay. We also require a ruby lantern. The ordinary lamp or candle lantern will not answer, as the former is disagreeable to carry, and while the latter may answer for changing plates, it melts too rapidly for developing. Both of these difficulties may be overcome by removing the lamp or candle stand and inserting a tin box the size of a blacking box; place in the centre of the box a piece of tin bent in such a manner that it will support a wick in an upright position; fill the box with melted spermaceti and the lamp is ready for use. When through developing extinguish the light and raise the wick a little while the spermaceti is warm. In a short time the spermaceti will solidify and the lamp may be packed. When the lantern is first lighted it should be inverted so that the heat may melt a portion of the spermaceti, otherwise it will consume the wick before enough of the spermaceti is melted to supply the wick.

We should be provided with three light trays and two graduates. This completes the list of apparatus. I would recommend the following as the traveller's developer and fixing baths.

The Traveller's Developer.

A.

Eikonogen..... 5 grains or 0.33 grammes
Hydroquinone... 2½ grains or 0.166 grammes
Sulphite of soda..... a sufficient quantity

Put the eikonogen and hydroquinone into a No. 00 gelatine capsule, and fill the capsule and cover with granulated sulphite of soda, (about 20 grains or 1.3 grammes).

B.

Fill a No. 0 gelatine capsule with dry potassium carbonate (about 12 grains or 0.4 grammes). These should be kept in a box wrapped in tin foil or paraffin paper, as carbonate of potash is very deliquescent.

When ready to develop dissolve the contents of one of A in two and one-half ounces of water and add one of B for full exposures, and two of B for instantaneous exposures. If preferred the ingredients may be put up in paraffin paper instead of capsules, or we may carry a vest-pocket scale, and weigh them as needed.

Traveller's Acid Fixing Bath.

Sulphite of soda, dried.....2½ drachms (10 grammes)
Tartaric acid..... 3 drachms (12 grammes)
Hyposulphite of soda, crushed or coarsely powdered..2 oz. by weight, or measure (60 c.c. or grammes)
Water.....7 fl. oz. or 210 c.c.

Dissolve in the order given.

The proper quantities of tartaric acid and sulphite of soda may be put up separate in paraffin paper and carried in separate boxes ready for use.

The fixing bath contains free sulphurous acid as may be seen from the following equation:

$$Na_2SO_3 + H_2C_4H_4O_6 = Na_2C_4H_4O_6 + H_2SO_3.$$

If compounded in the order given there will be no separation of sulphur as is the case when the acid is added to the hyposulphite first. Thus:

$$Na_2S_2O_3 + H_2C_4H_4O_6 = Na_2C_4H_4O_6 + H_2SO_3 + S.$$

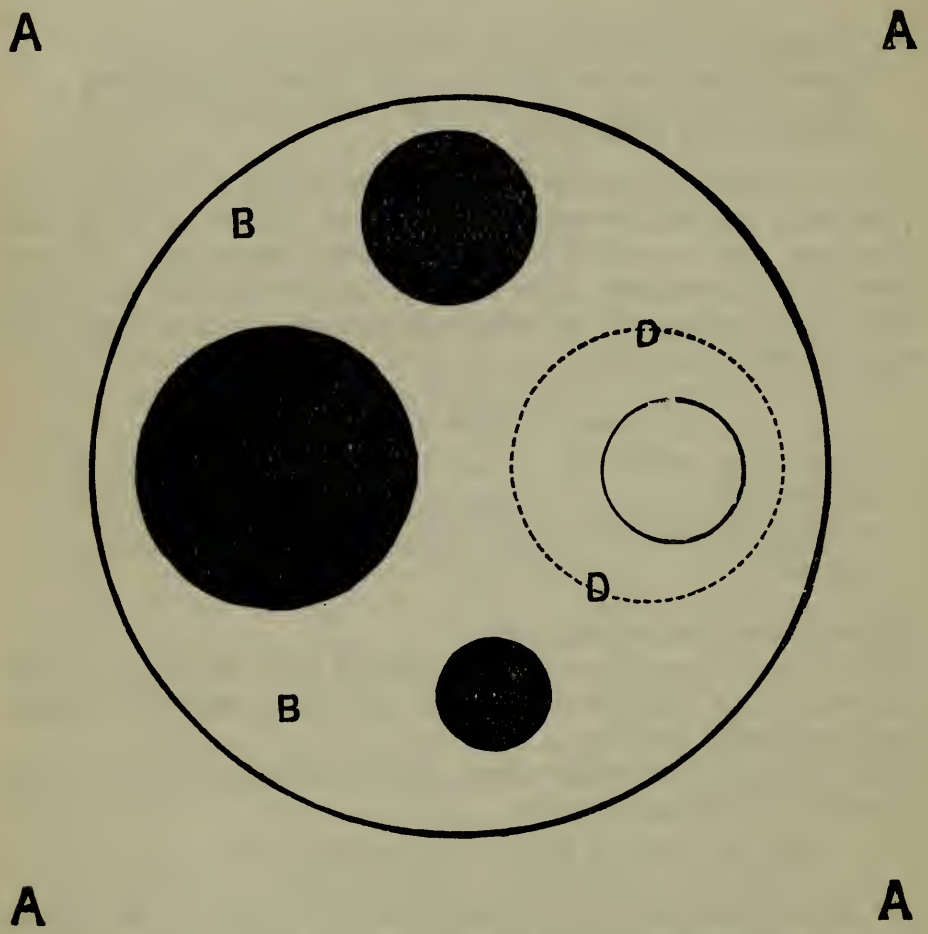
The advantages of this bath is, it produces clear negatives, free from stain, and in a measure prevents frilling, thus doing away with the alum bath. All of the substance may be carried dry and dissolved when wanted.

A. B. Stevens.

A RETOUCHING DEVICE.

During the past winter while constructing a retouching easel for myself, I endeavored to make an improvement on the old styles. How well I succeeded I will leave to the readers of the Annual to judge.

The following description, with the diagram accompanying it, will, I think, make the idea comprehensible.



In the face of the easel *A* cut a circular opening of the desired size and fit into it a piece of the same material *B*. In fitting, the edges should be rabbeted, or this piece or disc supported by a circular piece of brass or iron, so as to exclude the light and allow the disc to turn easily, also to permit it to be removed conveniently.

In this disc *B* cut such openings as your needs require. Attach to this disc in the centre on the under side a circular piece of black cardboard or ferrotype plate, in which cut one

opening of the same size as the largest in the disc. Place the opening in the cardboard behind the one in the disc you desire to use.

The diagram represents the opening in the cardboard (see dotted lines *D*) behind a medium-sized opening in the disc.

To use it, support the negative by the use of an adjustable bar extending across the face of the easel. By shifting the negative to the right or left and by moving the opening up or down by turning the disc, you have command of a large surface without any inconvenience. The disc may be removed entirely for large work if necessary. And if that does not give a large enough opening the disc may be fitted into a square or rectangular piece of the desired size, fitted into the face of the easel in the same manner as the disc.

A 7-inch disc with three openings is very suitable for cabinet work. *A. T. Tweedie.*

THE NUDE IN PHOTOGRAPHY.

The question of whether it is legitimate to photograph the nude is one that at the present day is pressing itself to the front for consideration; and the opinions expressed run through all shades of approval and disapproval.

At the very outset of such an inquiry we are forced to ask ourselves *cui bono?* and if one wishes to pose in the affirmative, he usually has to cast about a little for an answer to such a point-blank question. It may be said with truth that the study of the human figure has always been held to be a very important feature in artistic training (all schools of art have nude models); that they are of the utmost importance to the figure painter and the sculptor; and I once heard an artist of very thorough training say that one who had never drawn from the figure was handicapped as a landscape painter. But straightway we are reminded that photographers are not engaged in producing historical or ideal pictures, or in fact any work where undraped or partially draped figures must sometimes come in—in short, that photographers are not artists. This may all be true. How then can such work fall legitimately within the province of the men who make pictures with a camera? Furthermore, has not the sentiment of the community found expression in statutes that make the photographing of the nude an indictable offence? This is is also true, and to some extent it must be considered an unjust discrimination. It is very proper to prohibit whatever

tends to lewdness by statutory enactment, but is a nude figure when made by the aid of a camera necessarily more indelicate, indecent if you will, than when it is represented by pigments? The motive of the picture cannot be misunderstood by any observer—the pose, the air of the figure, and the general expression of the work all mark the sentiment of him who produced it. I was dining with an artist friend not long since in a café frequented only by gentlemen. Amongst the pictures on the wall was a life-size nude female figure, and when I called his attention to it he informed me it was one of his studies done in Julian's school in Paris. I remarked to him that if I had made a photograph of the same model in the same pose I should be a candidate for the courts if a complainant should turn up. "Oh!" said he, "it is quite a different thing—one is a work of art and the other a photograph with all its literalness." I had the courage to tell him that the difference was not apparent to me, that there was little for a photograph to represent that he had not expressed with his brush, and the added sensuousness of color sent it a whole bar's length beyond a picture in light and shade. Of course we did not agree, but the fact, as it seemed to me, remained. Here was a picture hung, not as a study, but expressly as an attraction of the place, which was very proper as a work of art, but which would be grossly immoral—an offence against the majesty of the law—if it had been a photograph. One other point my friend made that I came near forgetting—"If it was a photograph I could multiply it, or make numbers of them." I said that if *one* was unobjectionable the rest must be; and that seemed to me answer enough.

Poor photography is at odds everywhere—it is a suspected party—it is discriminated against. But perhaps it might be asked of what utility (it must be utility, photography could never rise above utility) could be done with a camera in this direction. For one thing, studies for painters could be made of much more value in many instances than the most skilful draughtsman could possibly produce, as the spirit of the pose could be caught in a second, which the model could not possibly maintain till the artist had secured it with his pencil, if he could do it at all.

Difficult and strained attitudes could also be secured which could not be held for any length of time. In such cases the artist with the photograph before him could work composedly and deliberately instead of hurriedly and excitably, as must be the case when depending wholly upon the model.

But aside from, and beyond all this, where photography sits in the ante-room awaiting the behest of the painter, may it not be that something could be done on its own responsibility. To represent the human figure in a masterly way is considered, I believe, one of the severest tests of an artist's skill, and a successful picture of this class is something of which he is naturally proud, and which connoisseurs admire and purchase. No one need assert that a figure from the hands of an artist, with a feeling for art and the training of the schools behind him, would find a very successful rival in a photograph; but nevertheless there is nothing beyond the resources of photography in representing a figure most beautifully in light and shade—with all that roundness and subtle modelling that is not elsewhere found. The majesty and strength of a male figure of the highest type, and the litheness and grace of the female when of the most perfect symmetry, should be ennobling to any beholder. But the conventional idea of the present day is that if rendered by photography it is meretricious and vulgar, only to be seen by stealth, and something to be kept from the eyes of young persons. It may be said that the number who have anything like an ideal figure is doubtless small, and there are various reasons why many of those could not allow themselves to be used as models. But in the case of professional models there would seem to be no valid objection excepting that the picture would be a likeness, an objection that is easily overcome by the turning of the head so that the features would not be recognized.

It may be argued that the photographing of nude figures would lead to immorality, but the same argument would hold with the painters, which I think will not be held to be the case. That there is a class of persons who can see nothing in an undraped figure but nakedness is unhappily true, but it may be that this class is more numerous from the morbid and prurient notions that so largely exist respecting chastity and propriety. It is but a few years since the virtuous people of New Bedford brought the full force of the law and of outraged public sentiment to bear upon Charles Hazeltine, an art dealer, for the enormity of exhibiting in the windows of his store a statuette of Narcissus. That stage of idiocy is now past in any community calling itself civilized, and it is to be hoped that an undraped figure, although a photograph, will one of these days be something besides an object of vulgar curiosity.

Gustine L. Hurd.

ORTHOCHROMATIC PHOTOGRAPHY.

We have been told in *The Photographic Times*, that orthochromatic means literally color-correct, but as the orthochromatic plate does not give actual color only the proportion of color brightness, it seems to me that the better interpretation of the word would be straight (ortho) to color (chromatic).

And not one-half enough has been said nor written in favor of the use of orthochromatic plates for landscape and interior work, for they are far superior to the ordinary plate, and we might illustrate it by saying that it is like crossing a new bridge on the road to progress. After leaving the every-day plate at the entrance we carefully and cautiously test the strength and quality of the new production, and finding it satisfactory we recommend and urge our friends to follow in our footsteps, and patiently wait for the completion of the road to actual color, having not the least desire to turn backward to the entrance, except for an cccasional trial for old acquaintance sake.

A landscape presents itself to our view, and we exclaim, "if we could only photograph the color." After exposing the orthochromatic plate we find a difference in the tone-value, and we can readily discern and name the different trees, towering one above another; the apple with its blue-green leaves will show a different tone from the elm with more yellow in its foliage, or the pine with a still deeper green. While this difference can only be discerned in nature, by the eye that is trained to find it, the orthochromatic plate will show it to us, and when the print is made, we find a marked difference in the tone value of earth and air and sky.

A picture taken at a time when the sun is low in the horizon, the yellow rays of the setting sun, reflected from the air, act as a color screen, and therefore no mechanical appliance is necessary. Nature gives us her assistance, and though in my experience the orthochromatic plate is not generally as quick in the early day as an ordinary plate through the action of these yellow rays, the time of exposure would be the same as at an earlier hour, whereas the other plate would require a longer exposure.

For dense woods or much-shaded roads, where the sunlight streams in sharply defined rays, the ray filter may be used to advantage, but of course the time of exposure should be at least twice or three times as long, while the effect is much more beautiful, subduing the strong contrast of light and shade, giving a well-blended effect to the picture.

It has no equal for use in interior work, where the different colors often separate themselves from each other in a marked degree, the wall giving one tone, the furniture another, and drapery still another; while it is better to use a ray-filter at this time, it is not absolutely necessary, and there will still be little or no halation around the windows if the picture is given a double exposure.

In developing orthochromatic plates it has been found more satisfactory either to work as far from the light, in the dark-room, as possible, or else to cover the developing tray with another, as they are extremely sensitive to red light.

Finally, do not discard the ordinary plate altogether but always use the orthochromatic for landscape and interior work and you will have better results.

Mrs. C. L. Pierce.

PRACTICAL HINTS FOR THE USE OF RODINAL.

We have now had the benefit of five months' experience with rodinal. So far the accounts received during this time are unanimous in speaking of the superiority of this developer for bromide of silver papers. For negative development, though the strongest endorsements of leading photographers have been received, some statements have appeared that not sufficient density could be obtained and negatives had to be intensified. At the same time they have been praised for the absolute absence of any fog, their fine penetration in the shadows and their sharpness. As a matter of fact no developer will *yield so easily such absolute density as rodinal*, and we will not neglect to consider this point in particular in the following notes on rodinal and its use for negatives.

1. Rodinal contains besides neutral sulphite and water only one alkaline salt of paramidophenol, but no excess of caustic alkali.

2. Rodinal can rightly be called permanent. This relates not only to full bottles, but also to partly used ones. Although it has been observed that the rodinal grows darker in color in opened bottles, still this change produces no effect noticeable in this concentrated solution. A ready-for-use solution of rodinal developer which has been diluted with water is naturally somewhat less permanent, as is the case with other diluted alkaline developers. It turns to a slightly reddish color on standing for some days and gradually weakens in developing power. If it is desired to keep a dilute solution for a long time, add in-

stead of water a 5–10 per cent. solution of neutral sulphite of sodium.

3. The highly concentrated solution which is the character of rodinal forms on long keeping even in unopened bottles small deposits of a white salt. This deposition is without influence on the developer, it forms from the action of the carbonic acid of the air on the sulphite added to preserve the paramidophenol salt, and which makes rodinal permanent. Under no condition is the energy of the developer weakened.

4. Since rodinal contains hardly any alkaline carbonate the use of distilled water for dilution is not necessary.

5. Every kind of dry plate in the market, rapid or slow, and of any make can be developed to advantage with rodinal. It is evident, however, that different makes of plate do not give the same good results with the same methods of working. Rodinal when diluted (1:10 to 1:20) develops very quickly and with strong contrasts, when more diluted (1:30 to 1:40) the development is slower and softer contrasts will be obtained. From this it follows, that plates which have a tendency to stronger contrasts must be treated with a more diluted solution of rodinal (1:30 to 1:40) whilst for the other kind a more concentrated solution (1:10 to 1:20) ought to be used.

6. If it is wished to make a strong rodinal developer (1:10 by 1:20) work slower, add to it plenty of a 10 per cent. solution of bromide of potassium.

This addition increases the time of development without influencing the character of the negative as much as in case of other alkaline developers.

7. As negatives developed with rodinal seem to loose density in the fixing bath, it is well to carry development somewhat farther than usual.

8. The developing power of rodinal being so much stronger than that of any other known developer, one is likely in the beginning to make the mistake of over-exposing. An over-exposed plate gives with rodinal developer (1:30) a negative rich in detail but thin. Such over-exposed plates are advantageously treated with a "strong" rodinal developer (1:15 to 1:20) to which is added considerably of a solution (1:10) of bromide of potassium. In this way it is possible even from over-exposed plates to get the finest detailed negatives with rich contrasts

In case of under-exposure the use of a strong rodinal developer (1:10 to 1:20) would give too great contrasts. The "high lights" would disappear again while waiting for the details

in the shadows to come up. Such under-exposed plates are therefore best developed with a "weaker" rodinal developer (1 : 30 to 1 : 40). The development lasts somewhat longer, but the reproduction of the lighting of the subject will be perfect, and should the negative be somewhat thin, it is in this case easily intensified.

10. The fact that the strong rodinal developer (1 : 10 to 1 : 20) causes more contrasts whilst a weak developer (1 : 30 to 1 : 40) works softer, gives a valuable mean to correct any shortcomings in the lighting of the subject. Negatives which have been taken in strong light (views by sunlight) are treated generally best with a weak rodinal developer (1 : 30 to 1 : 40), just as views which have been taken in diffused lights (landscapes in cloudy weather) ought to be developed by using the "strong" rodinal developer (1 : 15 to 20) with addition of some bromide of potassium.

11. It follows from the forogoing that it is well to begin development with rodinal diluted 1 : 30, and then, if it is necessary, to correct with a stronger solution, 1 : 15, and some drops of the bromide-potassium solution.

12. Finally it may be pointed out that the working of rodinal is hardly ever influenced by changes in the temperature, that it is, like eikonogen, absolutely harmless, while all other developers belong to the strongest poisons, that it does not stain the film and fingers, and is—last but not least—considered the cheapest of all known developers.

Arthur Schwarz.

A BOARD FOR CUTTING PLATES.

The occasion for cutting plates need not often arise among amateurs, but the professional has frequent use for odd sizes, or perchance a plate comes which fails to fit the holder. Whatever the occasion may be, a proper board and gauge for cutting the glass is a prime requisite, and a regular glazier's diamond is indispensable.

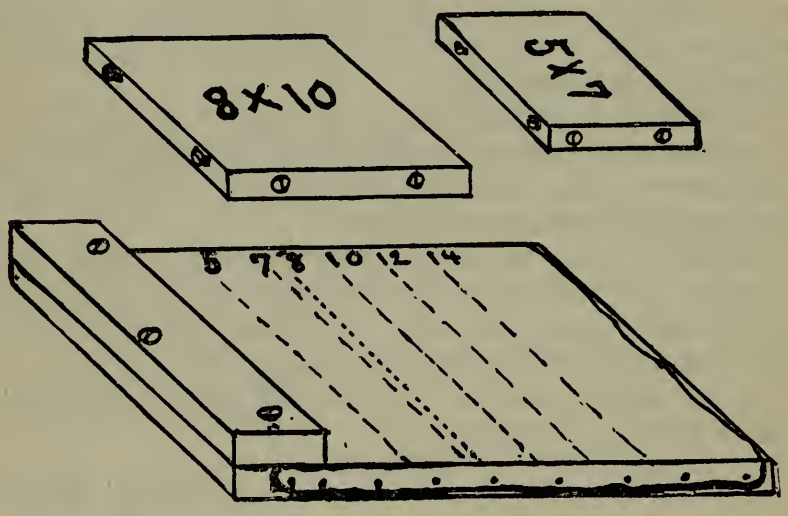
The arrangement here shown will be found most useful and handy.

A board should be selected or made, which is considerably larger than the largest plate ever to be cut. The left and the front edges should be square with each other, and the board should be perfectly flat.

Two thicknesses of manilla paper should be tacked over the board as shown, and then a hard wood cleat $1\frac{1}{4}$ inch thick should be screwed across the left end of the board over the paper—permitting a renewal of the paper if it should become torn.

Pieces of board should be provided, one for each size of plate to be made. These should be $\frac{1}{2}$ inch thick, and should be distinctly marked with their respective sizes, $4\frac{3}{4} \times 6\frac{1}{2}$, $3\frac{1}{4} \times 4\frac{1}{2}$, etc., etc.

The proper size of these boards is all-important and difficult to secure by cutting, but, by making each board $\frac{1}{4}$ inch smaller than the plate is to be, and then inserting two screws in each



of two adjacent edges, as shown, the opposite edges may be adjusted to cut exactly the required size.

The manner of using this arrangement is self-evident; for first cuts of large plates, guide lines might be drawn on the paper, and a draughtsman's T square used to cut by.

The board should be thoroughly dusted off after *every* cut to avoid marring the face of the plates.

The real usefulness of the apparatus lies in having for each size of plate a corresponding block which has been correctly and easily adjusted to cut the required size every time, and in total darkness if that were necessary.

C. D. Cheney.

MATT-SURFACE GELATINE EMULSION PAPER.

Of all emulsion papers, those for printing-out as well as those upon which the image is produced by development, none seem to have attracted the attention of an artistic public so much as paper with matt-surface. The results on this paper are of extreme delicacy and elegance in my opinion, and not yet attained by any other photographic printing method. At the will of the operator these prints may be given a variety of tone, from the red and sepia to the finest bluish-gray hitherto believed to be possible with platinum paper only.

The paper ready prepared for printing has become an article of commerce, is very durable, and keeps intact for many months, when stored in a cool place and when protected from the influence of light and atmosphere. Printing is done as with albumen paper a trifle darker, perhaps, than the finished picture is intended to be, the proof is washed first in distilled water, to which 4 grammes of citric acid are added to the litre, and afterwards from four to five minutes in pure water, and at once removed to the gold bath.

The toning bath consists of two solutions:

A.

Sulphocyanate of ammonium	20 Gm.
Sulphite sodium, cryst	1 Gm.
Distilled water	1000 Gm.

B.

Ter-chloride of gold	1 Gm.
Distilled water	100 Gm.

For use take 200 c.cm. of A and 10 c.cm. of B, diluted with from 100 to 200 c.cm. of water.

The prints should be kept in constant motion while toning, they first change color to a yellowish-red, but soon assume a purplish color, and finally the desired bluish-gray. They are then washed, fixed in the usual hypo bath for from three to five minutes, removed for about ten minutes to an alum bath and washed in pure water, till the drippings run off clear and without turbidity. They are now ready to be squeegeed upon a scrupulously clean and very fine ground-glass, the back pasted with gum arabic mucilage of sufficient consistency, and when dry detached from the glass, trimmed and mounted upon a well-moistened card-board, laid on and pressed down with a rubber roller.

Retouching matt-surface gelatine prints is a pleasant and

easy operation. They are afterwards coated with fine encaustic paste, which gives them slight lustre and magnificent brilliancy in the deeper tones.

A few remarks on these operations are certainly not out of place here.

All wash-waters and solutions the prints have to pass through must be of very low temperature, and the wash-waters before toning must be absolutely cold, in summer the water should be iced, else the gelatine film is considerably softened.

Toning may be done well by lamplight. The tone should be judged by transmitted light; when the lighter portions and half shadows begin to look bluish, even if the depths are still of brownish color, remove the print to the wash-water. If a brown tone is desired, the operation must be abbreviated.

Red tones are not possible to obtain upon matt-surface paper with gold, and then the platinum bath must be resorted to. The quicker toning is done, the more brilliant and fiery will be the print, and the finer the ground-glass prints are squeegeed upon, the more detailed they will be. The ground-glass must be rubbed down with alcohol and afterwards with asbestos previous to squeegeeing, when the prints will strip quite easily.

The crude paper used for the matt-surface is very often extremely thin, and it is advisable to attach to it first a piece of post paper before the mucilage is applied. The print will then be stout enough to permit mounting upon colored cardboard, without the color shining through.

The quality of these prints should never be judged before mounting. In the gold or in the fixing bath, or when dry and not mounted, they are too thin and diaphanous to show their beauty distinctly.

Negatives of average density will make good prints when correctly exposed and the shadows have acquired sufficient depth. Very intense negatives are not at all necessary; in frequent cases they are deleterious to the final result matt-surface paper is capable of producing.

A peculiar method of toning chloride of silver gelatine matt-surface paper is practised by me according to a formula by Mr. Emil Buchler, who first applied it to a brand of his own make, "the Mignon," but which may be applied to other similar paper with extremely fine results.

Prepare separate 10 per cent. solutions of chloride of strontium, terchloride of gold, sulphocyanate of potassium, and

filter each one separately and carefully. These solutions may be kept intact for several months.

To compound them into a toning bath, heat in a Florentine flask 1000 c.cm. of the strontium solution to 50 deg. C., add 100 c.cm. of the gold solution and increase the heat to boiling point. In a second flask heat 500 c.cm. of the sulphocyanate also to 100 deg. C., and pour it, small portions at a time, and by constant agitating into the strontium gold solution, still at a temperature of 100 deg., allow to cool and filter.

For use dilute 20 c.cm. of this strong solution with from 200 to 300 c.cm. of water, which makes a bath energetic enough to tone a print in from three to four minutes.

A Florentine flask containing liquids may be well heated to any degree, when between the flame of an ordinary gas-stove, and the glass vessel a piece of wire gauze, is interposed, upon which the flask rests. There is no danger of the glass breaking, when in the beginning of the operation aqueous vapors condensing upon the glass are carefully wiped off.

Friedrich Müller.

PHOTOGRAPHING LIVE-STOCK.

Patience and perseverance are certainly the cardinal virtues of photography. We would not go far wide of the mark were we to say: There never was a successful photographer, either amateur or professional, who did not possess these virtues in no small degree.

The successful photographing of live-stock horses, cattle, fowls, etc., for fun or business is one of the branches that weigh a man's patience to the last grain. Twenty minutes or even half an hour's time is not unusual in getting a frisky young colt in the right situation to properly show up his points, and at the same time to be placed right on the plate. This is when you must exercise your patience. Nail the flag to the mast with this, your motto inscribed thereon: "Don't be in a hurry." Keep repeating, singing it and even whistle it. Don't! "Don't be in a hurry," 'till your apparatus is packed away preparatory to returning home. An 8 x 10 camera is, I think, the best all-round size for this class of work. A rectilinear lens fitted with a pneumatic shutter, the best you can get hold of, is none too good. Any standard fast-plate will do. We all have our favorites in these things. And don't forget your motto, for it will be a most useful part of your equipment. Suppose you are going to a stock farm

to make a few pictures of some of the youngsters of royal blood. On reaching the barns first go and take a look at the subjects, note their color, whether they are going to take light or dark. This will help you in selecting a suitable background, which will be the making of your picture. Now look for a place to suit you. A long stretch of level grass land, with nothing to break the sky line behind it is not good. Find a fence with some trees near it, or a stone wall and bushes. A glimpse of the white farm house through the apple trees is always a pleasing combination. Anyway, don't give up the quest till you have the best the place affords. Now set up your camera with the sun if possible quartering behind you. Focus in the place about where you expect your pony will stand, with a stop as large as you can use and have him sharp. Your background will not be in perfect focus, but when you see the finished prints you will not be sorry. Now, and not till now, your attendant will bring the animal from the paddock and lead him around into your already composed picture. Get him the right size on the glass, not too large; note the field your lens cuts, and put a chip or stone about where his front feet should be. You will need this mark pretty soon. Now complete your focusing, draw your slide, and the circus commences.

If he is a yearling or over you may get him in the first minute; if six or eight weeks it may take you half an hour. He will bite, kick, rear up, race round and round in a circle, jump all four feet clear of the ground, and perform all the antics that only a young colt knows, till you wonder what he will attempt next. He knows what he is there for, is fairly bubbling over with enthusiasm, and has made up his mind to make it as interesting for you as he can. If you don't keep that *motto* running through your mind you will use all of your plates and go home badly beaten in the bargain.

You keep cool and let him do the work, he will get tired by-and-by, stop for a breathing spell and behave a little more circumspectly. Now let the attendant edge out of the field of the lens.

Watch the colt and you may soon catch him in the proper place. Click! goes the shutter. The deed is done just as he is starting off in another merry-go-round, but he was too late, you had him before he knew it, and you push the slide back in the holder with a feeling of complacency. Fun, wasn't it? Beats gallery work hollow you think.

Don't try to make these exposures too quick. Slow instan-

taneous is about the proper thing. You will find in this business that the picture taken in one-half a second is in every way ten times more satisfactory than the one taken in one-twentieth of the same time. Get all the light you possibly can, if it don't suit, beg to be excused for the time being. Know what things can *not* be done and don't be persuaded into attempting them. Your reputation depends upon this. There should be no difficulty in developing these exposures, as they will be found to require very little forcing. I start them with a pyro developer considerably under the normal strength, often requiring ten minutes to bring out the complete detail of my picture. Here again that motto is of use. When the details are well out, but with little density however, I pour off and flood with a fresh, clean developer 100 per cent. strong, and in two or three minutes I have a negative that is a beauty.

C. Alvord Washburn.

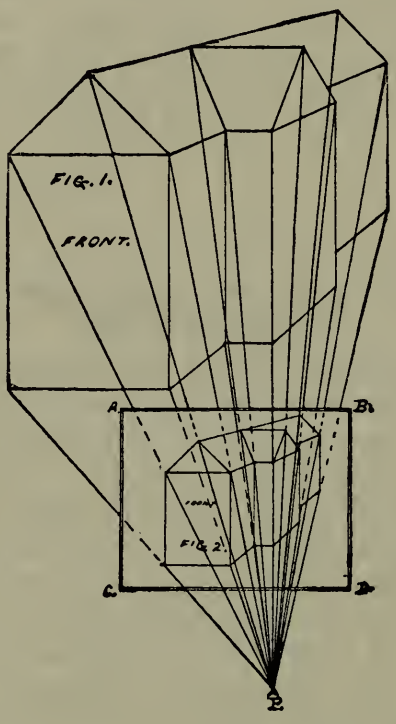
THE SWING-BACK AND ITS RELATION TO FOCUS AND PERSPECTIVE.

It is generally understood that the swing-back is used to produce correct perspective; but just how it secures such result is, probably, not very generally understood. And its effect upon the focus is still less appreciated. It is the purpose of this article to try to explain these two effects of the swing-back.

It will, perhaps, be of service to some to explain the meaning of the word perspective as applied to the representation of a building, as the word is generally employed. The following definition, aided by reference to diagram "P," may help to make this clear. The perspective outline of a building, as viewed from any particular point, is such an outline as would be projected upon a vertical plane, placed between the building and the point of view, by lines drawn from every point of outline of building through this plane to the point of view. This plane is generally chosen parallel to one of the sides of building, and then all parallel lines (vertical and horizontal) of this side of building will be represented by parallel lines upon the projecting plane, but horizontal parallel lines of other sides of building will not appear parallel upon the projecting plane, but will converge as they recede from the point of view. Fig. 1, of diagram "P," represents a building viewed from point P and A, B, C, D, a plane parallel, to front of building; and fig. 2 is a perspective outline of building,

formed by connecting the point where lines from building to point of view P cut the plane A, B, C, D. If this plane were placed as far beyond the point P as it is in front of it, the outline of fig. 2 would still be the same, only reversed. This last is the condition of a camera with lens at point P, and ground-glass occupying a position of plane A, B, C, D. The perspective just described is not the perspective as it would appear to the eye, if observing the building from the point P.

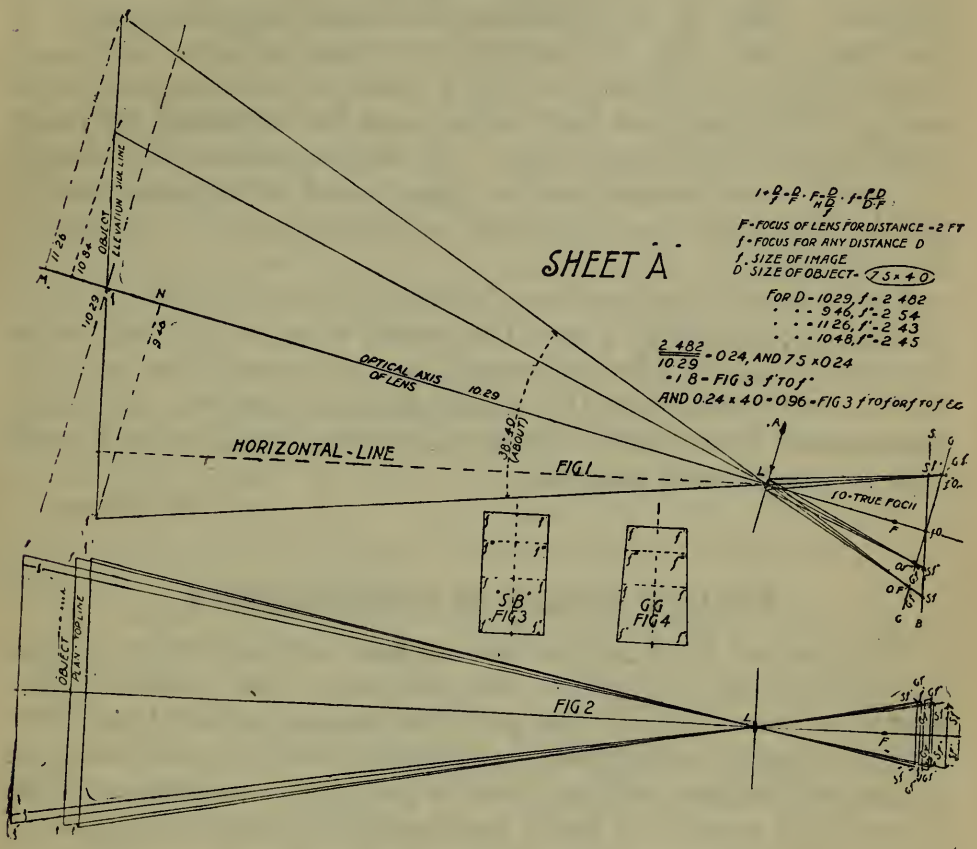
The part of the eye upon which the image is projected is not a plane but a curved surface, every part of which is at an



equal distance from the centre of the lens of the eye. Therefore to the eye, *all* parallel lines appear to converge as they recede from the eye. But pictorial representation based upon these last conditions is not so pleasing to the eye as the conventional perspective. If the plane A, B, C, D, were taken at an equal distance behind the point P, the diverging lines from P would tract the same image as before upon the plane. The parallelism of the vertical lines of image being dependent upon the plane being placed vertical, or parallel with the vertical front of building; this will appear more clearly further on.

Referring to sheet "A," Fig. 1 is a representation of a side or edge view of a building f'-f-f''; with a camera placed with

lens at L, and ground-glass (*g.g.*) at G–G, and (when used) swing-back (*s. b.*) in position S–B. The lens L is so directed that its optical axis is in line so marked, and cutting building at *f*. Three other points f^{I}, f^{IIII} and f^{II} in each edge of building, are considered (both edges being in line only one edge shows). The lens is focused on point *f*, so *f. o.* is the focus of that point. The focus of point f^{I} is at $o.f.^{I}$, due to the distance L. M. The focus of point f^{II} is at $f.^{II}o.$, due to



distance L. N. When camera is tilted, without using swing back, the ground-glass will be in position G–G; and when back is swung to a vertical position (or parallel with front of building), the ground glass will be in position S–B. It will be seen that the points of foci *f*, f^{I}, etc., correspond much more nearly with G–G than with S–B; thus showing that a rigid back is preferable to a swing-back, so far as focus is concerned. But the form of the image is as important a consideration as the focus; and an inspection of Figs. 2, 3 and 4 shows that herein the swing-back gives the best results.

Fig. 2 shows the lines of Fig. 1, as viewed from above, or at right angles to each of the lines of Fig. 1. In Fig. 1 the points *sf″*, G*f″*, etc., each represent two points (for each vertical side of the building), and in Fig. 2 the distance apart of these points is shown by the lines *sf″–sf″*, etc. So from these Figs. 1 and 2, we are able to construct the diagrams ″SB″, Fig. 3, and GG, Fig. 4. Fig. 4 being the image of the building as projected upon the ground-glass when rigid, and Fig. 3 the image when the ground glass is swung to a vertical position. Fig. 3 is a correct rectilinear representation of building, while Fig. 4 shows the vertical sides of building, as converging at the top. Fig. 3 will not be in as good focus as Fig. 4, but that is a fault which can be remedied by using a sufficiently small diaphragm. In all cases where the camera is tipped to any considerable degree, and swingback used, a small diaphragm must be used, without regard to the conditions of light.

Fig. 2 may be assumed as a vertical view of the side *f–f* of a building; and Fig. 1 as a horizontal view; thus illustrating the conditions and effect of swinging the camera sidewise; and which are evidently of the same nature as before. It is thus unnecessary to represent the double swing, which would make a quite complicated diagram.

C. W. Grant.

FALLOW FIELDS IN PHOTOGRAPHY.

"Count no field fertile which has not lain fallow seven years," says an old Farmer's Almanac, and, possibly, this may serve as a text for that practical article which the editor of The Annual wishes me to write, for what is more essential to success in any calling than a proper preparation of the ground for crops. I know most people preach the gospel of work, yet I venture to give a hint of rest-cure in speaking in truly rural phraseology of the Sabbath year of apple orchards when no barrels are filled for market, and would respectfully suggest to plate-spoiling, developer-wasting amateurs that they pause once in a while to reflect like their ground-glasses, and to gather strength to do better things later. Professionals, of course, must pass this luxurious hint by, but those who do not work for bread, hardly for cake, may very profitably come to a full stop now and again.

Who ever heard of a darkey with nervous prostration and why? He always spends half his time, or his employer's,

surveying the job before he undertakes it. Metaphors must not be pushed too hard, so I will say nothing of the final satisfactoriness of negro labor, but will speak of the Japanese designer who sits two hours before his subject without pen or pencil that he may thoroughly understand the outlines, hence the accuracy of this class of decoration. A photographer told me no machine should be made to contain more than a dozen films or plates as the temptation to make more exposures than profitable was irresistable.

"They bring me ten views and nine are bad," he said, "and if they had taken more pains with one there would not have been any loss, rather gain. Look at the horrid things," he added, and I looked at a tank full of blackened failures and sighed. Doubtless, the senders of the pictures sighed louder, when they called for the result of their season's fun.

A friend lately returned from California has exposed all her films, a professional is finishing them and she tells me she will have six albums to show visitors. Pity the innocent caller who asks, "Did you take your camera with you?" Later, he goes away yawning, sorry he asked.

Another amateur meets me in the Catskills and says, "Here I am weighted to the earth with this 5 x 8 outfit because every one at home insists I must bring back views. I really dread the development, yet if I put them out I shall have such a bill to pay, and, besides our local photographer does not take half the pains he should."

Are these lovers of the art, do you think? *The photographic appetite grows upon what it feeds*, says a well-known advertisement, but, sometimes over-eating causes indigestion, and nothing brings on prostration like lack of assimilation of food. I am glad the Stock-houses insist on good prices for their goods, else we should one and all be in the lamentable state of the boy on Thanksgiving Day who wept because he could not enjoy his third piece of turkey—maybe it was his fourth or fifth piece and I have underrated his capacity.

Dust on lenses is bad, deteriorated plates will not work, old chemicals are worthless, yet these things can be renewed more easily than the tired mind. It is really impossible to take everything in one summer, and eyes would be lacking to enjoy it, if it were all taken and mounted in albums, so Brother and Sister Amateur, when you wish you had not six more plates to fix, sixty more to put on cards and to wonder why you promised Mary Jane and John Jones a dozen prints apiece of the last picnic group, when you get "that tired feeling" spoken

of by Lydia Pinkham and others, consider the advisability of letting the photographic field lie fallow.

"My pictures never get any further than blues," a distinguished worker said to me, only yesterday, "and when I looked at his excellent negatives, for which he continually has to build more barns for storage, I wished he would stop taking till rested enough to make some of those beautiful bromides and platinotype prints of which he has given us too few samples."

No road is more interesting than that over which "no thoroughfare" has for awhile been posted. Remember this, too zealous friends, and rest.

Adelaide Skeel.

SOME PHOTOGRAPHIC DON'TS.

Don't turn your gallery into a smoking room thinking that every one is in love with the weed just because you are; many ladies would shun a place that is always polluted with tobacco smoke.

Don't think that because you live in a country town that you can allow the dust to gather on your show cases, furniture, etc., so that your friends can write their autographs on them when they pay you a visit.

Don't lay things around promiscuously after using them, so that the next time you may want them you will have to waste much valuable time in hunting them up.

Don't allow the stains to accumulate on your fingers so that your friends will shudder when you reach out your hand for a friendly shake.

Don't loose your temper with the little ones, even though they do try your patience to the utmost. Many a dollar has been lost to a photographer in that way.

Don't mount your prints carelessly, so that they will always be an annoyance to every person who has a correct eye.

Don't urge a customer to accept a photo which you know to be imperfect, for a good trade is not built up in that way.

Don't show a customer a photo of the homeliest person you ever saw, for it might prove to be one of his own relatives.

Don't, under any consideration, run down the work of your neighbor across the way, thinking that by so doing you will benefit your own trade, but do your best to please and let your work stand on its own merit.

Mrs. R. J. Reese.

ON TONING AND FIXING IN ONE OPERATION.

We have, the first, since about two years, undertaken a campaign against the very old process—which never should have been revived—of simultaneously toning and fixing the photographic image; and we are gratified to see that our advice has been taken into consideration in this country and abroad.

If we again choose this subject for our contribution to The Photographic Times Annual for 1893, it is because *The Times*, in which our articles were published, notwithstanding its very large circulation, does not reach, however, so many professional and amateur photographers as does The Annual, which goes to more than 18,000 photographers, and because we think well of spreading the reasons—not new by a good deal—which led us to engage one to return to the toning and fixing in separate operations.

We cannot, in the space to every one allowed for his contribution to The Annual, recall the extensive researches made by experimenters and ourselves to find the origin of the fading of silver prints, and the means, by avoiding the causes, to render the image as permanent as possible. The reader interested in the study of the chemistry of photography will find articles published on this matter in *The Times* for 1892. We refer him specially to the paper "On the Causes of Fading," published in Nos. 556 and 557 (May 13th and 20th, 1892).

The main cause of fading is the conversion of the metallic silver, which constitutes the image, into silver sulphide. This conversion also constitutes the toning phenomenon taking place in combination baths, which, as it is well known, are prepared to evolve sulphur compounds, and, consequently, to impart sulphur to the metals in contact with them.

And were not these baths so prepared, the silver would be, nevertheless, more or less superficially transformed into sulphide, for it is said that the prints should be toned-fixed without being previously washed, and all the aristotype and permanent sensitive papers contain, besides free nitrate of silver, an organic acid—citric or tartaric—necessary for the preservation of the sensitive film.

Now, sodium thiosulphate (hyposulphite) is decomposed by any acid, sulphur being precipitated and sulphurous acid, SO_2, evolved. Hence, the sulphuration of the silver. This is unavoidable in the circumstances in question: *All photographs, whether a negative or a positive, will be sulphuretted*

in being treated by the combination toning-fixing baths, or by what is termed acid baths.

It has been told that Dr. Valenta and Dr. Eder recommended the toning-fixing in one operation. We know nothing about the authenticity of this statement. If true, we would be greatly astonished.

We remember that Dr. Valenta has published a very elaborate paper showing by chemical equations that the toning process was one of sulphuration, which is the point in question, and gives formulas for the same, but not venturing himself by saying that the process yielded as permanent images as those obtained by the ordinary process, which he well knows that not to be the case.

We know that Dr. Eder has stated that the addition of auric chloride to combination bath was useless—which was shown years ago by Hardwich and others. We know also that the savant Doctor says that he has kept proofs, toned-fixed in the manner now in question, for a few months exposed to light without their showing apparent signs of yellowness; but he does not state whether these proofs possess as great a stability as those toned then fixed as albumen prints. He does not state neither what is the degree of sulphuration the proofs have been subjected to.

This is important, however.

In our experiment we have shown that *the proofs are so much the less permanent as the sulphuration of the silver is more complete;* thus: when the proofs are toned red brown—which we may consider as the first stage of sulphuration—they are more permanent than those toned to a purplish brown or —which is the last stage—to a dark purple. The former proofs we have exposed to the action of light and that of the atmospheric influences for ten weeks; the brilliancy of the color was altered, a certain change occurred in the half-tints, but little yellowness was detected. Those toned to purple faded more or less rapidly in the same period, the yellowness appearing even after a few days' insolation in the proofs toned dark purple.

We have also shown that yellowness occurs in the toning-fixing bath when one attempts to tone deep dark purple, or when the prints remain a long time in the bath before the desired color is obtained. The latter proofs fade rapidly even when the yellowness is not perceptible after fixing.

To conclude we condemn the process of simultaneously toning and fixing the images. Let every one return to the

rational process we have for so many years successfully employed, and which is advocated by the highest authorities in photography.

All the toning baths do not equally work well with every kind of aristotype paper. We have generally obtained fine and brilliant tones with the chloride of lime, phosphate and borax baths. The formulas are found in THE ANNUAL. Remember that the aristotype papers—collodion or gelatine—contain free nitrate of silver and a free acid which, if not eliminated by washing until the water remains clear, will greatly interfere with the toning.

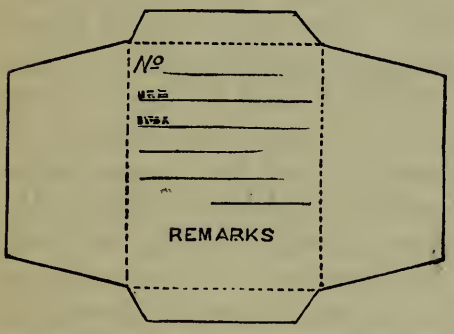
P. C. Duchochois.

A GOOD NEGATIVE ENVELOPE.

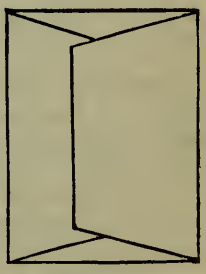
MANY a good negative is spoiled by not being properly protected after development.

A wrapper that I have used for some time with good success is made from 120-pound tag stock, and cut, as shown in the following drawings.

The stock is "scored" on dotted lines for ease in folding.



OPEN.



CLOSED.

The particular advantage in this holder over the envelope style is that, being made from HEAVY stock, it is a better protection against scratches and breakage, and not being *glued*, there is no danger of scratching while inserting the negative.

On the back are printed lines for recording the number, title, plate, lens, stop, exposure, date, and remarks.

While I do not claim that the holder will prevent breakage from dropping on the floor, I do think the amateur will feel rewarded for his trouble by trying this style of protector.

E. F. Bachelder.

SNAP-SHOT DEVELOPMENT.

To write something new in connection with photography is almost daily becoming more and more of an Egyptian task, and when one *must* write he is almost per force compelled to, like a preached-out parson, give his readers "cauld kail het again."

This must be my excuse for returning to a subject that is generally supposed to have been threshed out long ago, but which, judging from a large number of *shutter* negatives that I have recently had an opportunity of examining, is as yet far from being universally understood.

I take it for granted, that, in spite of all that Hurter and Driffield have written to the contrary, the tonality, or degree of gradation in a negative is influenced by the method of development, and especially by the relation between the oxidizer and the accelerator—between, say, the pyro and the soda.

Probably different brands of plates require for their perfect development different relative proportions of the constituents, at least their makers seem to think so; but it may be assumed that on a good plate that has got something like a correct exposure, a satisfactory image may be developed with a solution containing from two to three grains of pyro and from 10 to 15 grains of soda in each ounce. But snap-shotted plates, except on well-lighted marine subjects, and peculiarly favorable landscapes, are rarely well-exposed, and to secure even passable results, require a considerably modified treatment; but as to just what that modification shall be, snap-shotters, like doctors, differ much. One school doubles or trebles the strength, the other reduces it to as great an extent, and both retain the normal proportions, and they are both wrong; as the result in either case, although greater in that of the strong than of the weak men, is excessive hardness due to the absence of proper gradation.

If it be true that the oxidizer tends to density in the lights, and the accelerator to delicate detail, and that is generally admitted, a minimum of the former and a maximum of the latter should in some degree, at least, compensate for lack of exposure; and it does.

Discouraged by most of the snap-shotting that I had seen, I had until recently resisted the charms of the hand camera; but seeing that in some cases a poor picture was better than none, I turned out a home-made one, putting in a 4½ inch Beck, which with F/11 covers a 4¼ x 3¼ plate perfectly. The first experi-

ments were not encouraging; white and black, or, as it was wont to be euphemistically termed, "soot and whitewash." Consideration of the subject, however, on the lines above mentioned led to readjustment of the relative proportions of the pyro and soda, and, under favorable conditions, I now snap away to my heart's content, in the full expectation—and I am rarely disappointed—of getting first-class negatives, full of delicate detail, and of any required density.

The pyro and soda are kept in 10 per cent. stock solutions, and I commence with from a quarter to a half a grain of pyro, and from ten to fifteen grains of soda to each ounce. The image generally appears in about a minute; and if in half a minute more the detail is not visible—by reflected light—half the original quantity of the soda solution is added; or should detail and high lights appear almost simultaneously, the same proportion of pyro is added instead of soda. Generally, development, so far as full detail is concerned, is complete in about ten minutes, but as a rule the image is too thin to give brilliant prints. To remedy this, an addition of two grains of pyro is made to each ounce, which in a few more minutes produces the desired effect.

John Nichol, Ph.D.

THE NEW COLD PLATINOTYPE PROCESS.

In the exhibitions of the past winter a most noticeable increase in pictures of the "flat" order was marked, pictures on rough, unglazed paper, showing up more like engravings or etchings than photographs. These pictures were, I noticed, in the majority; occupying in various exhibitions from fifty-five to eighty-two per cent. of the catalogues. They were in platinum, carbon, bromide, flat silver, uranium and other processes, and to judge entirely from the published criticisms on these exhibitions, none had ever *equalled* them. It would seem then that the public is more than beginning to appreciate this form of print, and as a modification of the platinotype process has just been introduced which so greatly simplifies the old process that any one may use it without the least of the bother attending the old hot-bath paper, it shall be my purpose to briefly describe this new and simple yet most beautiful process.

In the old form the paper had to be printed just about right, a difficult matter to those unused to it as the negative

was never allowed to print wholly out, and was then immersed in boiling solution of oxalate of potash, where it *immediately* developed. If good, all right; if over-printed, all that could be done was to make another. The new paper looks exactly the same as the old, the sensitive side being of a canary color, and on, perhaps, slightly heavier sized paper.

The new paper is allowed to print out considerably further than was the hot bath, and is therefore much easier to manage, but as if the inventor had intended to thoroughly preclude *any failure*, it seems to make little matter whether it is printed right or not so long as it is printed enough (under-printing has, in my experience, no remedy). The print being made is immersed in a saturated solution of oxalate of potash used perfectly unheated, and will develop in from two to forty seconds according to its depth of printing. After developing it is immersed in three changes of acid water (muriatic acid 1 ounce, water 60 ounces), is rinsed in water a few minutes, and is then pasted upon a heavy mount with India tint centre. The result far surpasses the old process in tone and delicacy. I have never seen such velvety blacks or such pure prints from either thin or dense negatives as some I recently made on this paper. With the old process, *dense* negatives were required to make the best prints whereas the new paper prints almost equally well from dense or thin.

The developer costs but little and can be used many times before discarding. The acid bath must be made fresh each time.

When the simplicity of the process is considered in connection with its rapidity, cleanliness and beauty, one can readily afford the very slight difference in price it costs over some of the glossy processes. There is so much latitude allowed in printing that failure seems impossible. It would be difficult for any one to tell the difference between two prints from the same negative which I have, yet one was exposed four minutes, the other eight; both are excellent. The four-minute one developed in about seven seconds, while the eight-minute one developed instantly in very dilute developer. As all these operations can be done in subdued daylight and require *very few* chemicals or fussing, it is my very great pleasure to congratulate the inventor, use it almost exclusively, and heartily recommend it to all who desire to combine beauty of prints with ease, simplicity, and certainty.

E. W. Newcomb.

THE AID OF PHOTOGRAPHY IN THE STUDY OF THE SUN.

It is only within the past year that photographic methods have been successfully applied in the daily investigation of solar phenomena. At the same time it is true that in no department of astronomical research are the advantages of the sensitive plate more apparent. Eruptions frequently occur on the sun which are so short-lived that the observer is not able to faithfully record the varying changes by the pencil alone, while the photographer has no difficulty in obtaining a permanent and trustworthy record of every phase of the phenomena. The prominences which are seen at total eclipses to to be cloud-like masses rising from a sea of calcium vapor and hydrogen gas completely encircling the sun, can only be observed and sketched one by one, so that to record all prominences visible around the entire circumference of the sun requires more than an hour's steady occupation. The same thing can be more accurately done by photography in less than a minute.

And the photographic method not only surpasses the visual in accuracy and dispatch; it also does what the eye cannot in the very nature of the case do—it records the invisible. The first and most obvious use of this power of the sensitive plate is in the investigation of the ultra-violet region of the spectrum, which is invisible to the eye on account of the extreme shortness of the light-waves. During the past year the ultra-violet spectra of the solar prominences, spots and faculæ have thus been studied for the first time, with the consequent addition of some twenty-five new lines to the known spectra of these objects. Indeed, the very first result following the application of photography to this work in April, 1891, was to greatly change our ideas of the nature of the solar prominences. What had before been universally considered to be mainly composed of hydrogen gas were now shown to consist more largely of calcium vapor than of hydrogen itself.

The faculæ are bright objects on the sun's surface which are seen in the vicinity of sun-spots, and sometimes in isolated groups. They are somewhat brighter than the surface of the sun close to the edges of the disc, but not so bright as the central portion; for the brilliancy of the sun's disc decreases from the centre to the edge. The consequence is that the faculæ can be seen only in a very narrow region close to the edge of the disc, and soon disappear as they are carried toward the centre by the sun's axial rotation. Even photography has

failed until quite recently to surpass the eye in work on the faculæ, but a method is now in use by which these objects are photographed in all parts of the sun's disc with equal facility.

The instrument with which the above results have been secured is called a "spectroheliograph," and has been employed daily since January, 1892, in registering the condition of the solar surface. It was designed by the writer in 1889, but was not practically worked out until the time just mentioned. It consists in general of a large grating spectroscope, with two movable slits actuated by a water clock, and is attached to the 12-inch double equatorial telescope of the Kenwood Observatory of Chicago University.

George E. Hale.

ON THE PHOTOGRAPHIC HALO.

Photography is rightfully proud of giving a true representation of the reality; but, as in the practical application of every delicate process, certain difficulties occur which alter the perfection of the principle.

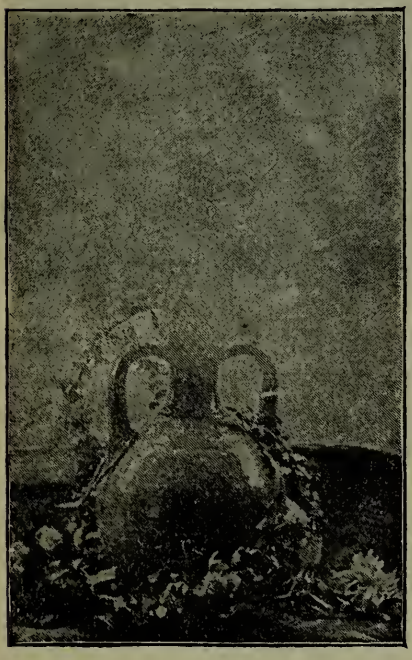
In the case of photographic proofs on glass plates, as well as on pellicles, there is a disturbing cause which gives rise to a strange effect well known by photographers under the name of *halo*. When the photograph is taken of an intense luminous source (electric lamp, gas burner, or oil lamp, or even a single candle) we observe the apparition of an aureola of an intensity comparable to that of the source; this is an elementary phenomenon. When the luminous surface, instead of being very narrow, as in the preceding case, is very large as that of a window lighting an interior, the halo occurs as a large fog which diffuses the light around the lighted surface.

Lastly, in more delicate circumstances, this halo, to be less visible, does not the least alter the relation of the photographic intensities of the contiguous objects; it is mostly to that cause which are due the imperfections of certain photographic proofs which does not represent the artistic effect of the model, specially when the contrasts of light are strong and when one searches for the details in the shadows.

Those effects are due to a *total reflection* taking place at the second surface of the glass plate or of the pellicle. They very easily disappear by preventing any kind of reflection on this second surface by means of a very simple process: It suffices to coat the back of the plate with a varnish absorbing the chemical rays. The means has been a long time and

often indicated, but rejected as ineffective because the essential conditions which cause the process to succeed were not understood, conditions a little delicate, it must be admitted.

The optical analysis of the phenomenon has permitted me to demonstrate that the essential condition of this varnish is to *exactly* possess the same index of refraction as the glass plate or the pellicle upon which it must be spread. This result is easily attained by compounding a mixture of essential oils of cloves, turpentine, cinnamon and fennel.



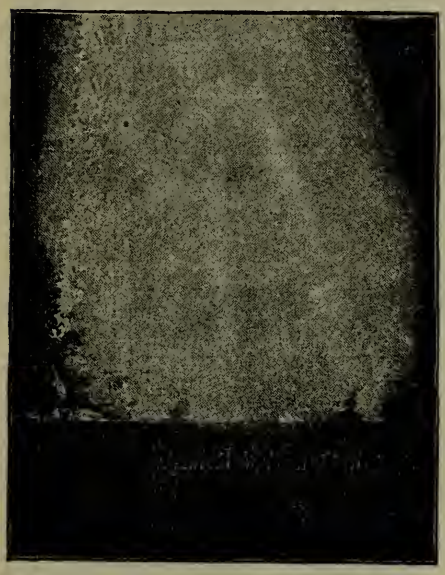


The oil of fennel or that of cedar employed by the micrographers for the use of lenses for immersion called *homogenous* is very proper to constitute the fluid part of this varnish. It suffices to add some lamp-black and to spread the mixture with a brush on the back of the sensitive plate; it is wiped off before developing.

Thanks to this simple precaution the proofs gain in purity and are free from those accidental phenomena so troublesome and so inartistic.

I send with this article a series of proofs to illustrate the process. They are the images of the same objects simultane-

ously obtained on the same plate during the same time of exposure with a stereoscopic apparatus; only half of the pho-





tographic plate was on the back coated with the black varnish and the other half was not, as in ordinary use.

The ordinary image presents a horrible halo or fog; the other image is entirely free from it.

A. Cornu.

THE ROMAN AMATEURS' CLUB.

As it may happen that some of the readers of The Annual should plant their tripods or point their hand-cameras in the Eternal City, I believe that they will be glad to know that our club has hospitable dark-rooms always open to the stranger, and that on emergency there is also a competent operator who will charge himself with the development and printing of the photographs which the wanderer may not think fit to finish for himself. It occupies one end of what used to be a Temple of Neptune, the *cella* of which has been transformed into the Bourse of Rome, the upper story of the club quarters containing two independent developing rooms, with a terrace on which trial exposures may be made, and the printing and operating rooms occupied by the Cavalier Montagna, whose services have been recognized by many English speaking amateurs who find it safe to entrust him with their rolls and plates for development, or ready to help them in what they prefer to do

for themselves, being an accomplished photographer in all branches. The portrait studio is on the floor below, with two other dark-rooms, one attached to the studio and another to the enlarging room, the council room, a small photographic library with all the principal photographic journals, and a billiard room, and on the first floor is a fine assembly room for social purposes and camera-obscura, or as we prefer to call them, lantern exhibitions, fitted with a dissolving view apparatus with lime-light, &c., &c., the ground floor containing four more dark-rooms with gas-light, and an abundance of running water, cool and constant through the hottest summer. There is no pretention to the palatial style of the London Amateurs' Club, but the wayfaring brother of the sun-pencil is just as well received, and just as well off, as he would be there, with no other formality than calling on a member and making himself known. In the winter we do our work in the upper rooms and when the gelatine begins to melt in the bath, we adjourn to the ground floor where heat never interferes with work or comfort.

Our club comprises some distinguished amateurs, the President, Prince Ruffo d'Artaria, having shown the finest portrait character heads I have ever seen by professional or amateur, for taste and artistic feeling in pose and costuming; and the brothers Counts Primoli, nephews two generations away, of Napoleon I., are famous all over the Continent for their inexhaustible activity in the pursuit of novelty for the camera, and especially for instantaneous work, and in an exhibition of the work of the club, for which the management of the last Roman Exhibition of Art and Industry gave us a room to ourselves, the two had about ten thousand prints. They say that the elder has a collection of 60,000 negatives, mostly small instantaneous subjects, but he has also a large collection of large portraits of distinguished people, one of his latest being the best by far of "Mark Twain" I have seen, and as portrait not to be beaten by the work of any professional. One of the Caetani family, the head of which has for some centuries been at the head of the Roman liberal nobility, Dukes of Sermoneta, waging war on the Pope as long ago as the fifteenth century, has done some of the best landscape work I have ever seen in photography. As a general thing one does not acquire a profound respect for the Italian nobility and especially of the old Roman, but when they come out on common ground and do something really fine, it is a pleasure to acknowledge it; it makes one hope for better days for Italy.

And while dealing with Roman photography I may give some useful hints to amateurs who want to get hurried souvenirs of Rome and have not the time to search out the best points of view. One of the most picturesque subjects in Rome, the Tomb of Hadrian, with The Bridge of S. Angelo, as taken from the left bank of the river is now destroyed by the modernization of the picturesque old bridge, but the monument itself may be taken to better advantage in the forenoon from the new bridge, just below. St. Peter's is best taken from the Corsini gardens on the Janiculum, looking from the bastion of the city wall, an afternoon view. The panorama of Rome from the same garden, open to the public at all times, is very fine, and for those who affect that kind of subject, may be taken soon after noon. The front of the Capitol is a late afternoon subject, taken from the open space in front of it, or from the street below. The best view of the Forum is from the head of the steps which lead from the Capitol down into the Forum, at about 2 P. M. The opposing view, from the mass of ruin east of, and just above, the House of the Vestals, looking towards the Capitol, is a morning view, as is the nearer subject from the eastern end of the Forum, with the Arch of Septimus Severus, the Temples of Concord and Saturn; the Temple of Faustina, that of Romulus, and the Bazilica of Constantine are best in afternoon light, as is the House of the Vestals, to be got from the road at the south, near the Church of S. Maria Liberatrice. The Grecosasis, with its beautiful three columns is best in the morning from the open space in front of the Temple of Romulus. The Arch of Titus, with the Coliseum in the distance from the Via Sacra comes best about 3 P. M., but the Arch of Constantine in the morning. For the Palace of the Cæsars permission must be got from the Ministry of Public Instruction, and the best views are all afternoon, that of the Forum, that of the Coliseum from a distance with the Arch of Titus, is got on the north side, but the rest are all on the south side, and are found by taking the path to the right as one enters the enclosure. The Temple of Vesta, with the fountain of the Bocca della Veritá, makes a good morning view, and the Temple of Fortuna Virilis is only to be got in the sun in the afternoon. There is a fine afternoon view looking up the Tiber, with the Aventine at the right and the Capitol Hill in the distance, the shipping port at the left on the other side of the river and sometimes picturesque steamboats to be taken from the *Marmorata*.

The Pantheon must be taken early in the day or late in the

afternoon in June or early July as the façade faces the north and the sun only reaches it in the long summer days. For the fine ruins of the baths of Caracalla permission must be got, the same one that gives admission to the Palace of the Cæsars (also to the Museums), and the views are best in the afternoon.

W. J. Stillman.

MARINE PHOTOGRAPHY.

Some years ago I purchased a *Waterbury 4 x 5 Detective Camera.* No investment has ever given me a larger return in the way of pleasure. To this day it works with perfect satisfaction, and comparing my negatives with those taken with much more elaborate apparatus I have no reason to feel ashamed of its work.

Long ago I found out the capacity of a hand or "snap" camera, and I have no hesitation in saying that for marine views—by which I mean pictures of boats, yachts, steamers, etc.—it gives the best of results.

My first efforts in this line were made from the wharfs. I soon discarded this plan of operation, for one was too much a victim of circumstances. Vessels had a very awkward way of being on the wrong tack, or shortening sail just as the proper distance was reached to give a good-sized picture. Then I endeavored to secure "snaps" from the deck of a ferry-boat. This was an improvement, but still not satisfactory. Then a row-boat was pressed into service and still better results followed.

Finally, a friend, who owns a steam launch of goodly size, invited me to follow the yachts engaged in a race. Here was my opportunity. We could run along side, could lie almost in the path of the approaching vessel, or take any position most likely to produce an artistic effect and so obtain just the picture needed.

My plan now is to take my station at the *bow* of the steamer, and ask the steersman to run within a hundred feet and toward the lee side of the approaching yacht. If this happens also to be the sunny side the result is very pretty. Even if one has to be on the shadow side, so long as the sun does not shine into the lens, the effect is pleasing and gives that idea of life and motion which makes a yacht picture so charming. A view in which the vessel is coming toward you is by far the most agreeable to the eye.

If the boat is close-hauled, or sailing free, she looks well, but do not try a stern view, as a general thing, and if possible

avoid the windward side. The picture of the bottom and almost the keel of a sailing yacht is not particularly pleasing. Be careful to see that no flag-staff, stanchion, rope or flag belonging to the boat on which you are, comes into the picture; close inspection of the finder will prevent this.

One trouble with hand cameras with lenses including wide angles, is the preponderance of foreground in the picture. You can lessen this by slightly tilting the box up in front, and as well by holding it as high as you can, to at the same time keep it steady.

I have seen some people who always gave a slight jar to the instrument at the moment the shutter was released. I think this can be avoided, if the camera is held clear of the body. I raise mine as high as my chest, supporting it principally with the left hand, the fingers of which are placed under and around the box, the right is made to support the front and side, well up, and the index finger rests lightly in contact with the knob controlling the shutter. When the moment for exposure comes, a slight increase of pressure, which is not a push or a tap, releases the shutter and the exposure is made.

In developing such a negative, I always begin with a small amount of pyro. I am old-fashioned and still use this reliable agent. The object photographed, consisting of a dark hull with white sails, and the whole resting on the water, presents a combination with very different degrees of reflecting power. Frequently the curling, frothy waves, and the foam-specked wake, are in themselves a picture, but it is very nice if you can in addition get the outline of the hull, the ropes of the mast and the seams in the sail. By beginning with a reduced quantity of pyro you can get out those details and then by adding more acquire the density needful to give you a good printing negative.

At this season of the year, I see no appreciable difference in the actinic power of the light between 1 P.M. and 4 P.M. o'clock. I use a stop reducing the lens aperture to $f/15$, and set the shutter at its quickest speed. Sunshine is not at all necessary, indeed it is frequently a disadvantage. If clouds are passing, obscuring the sun now and again, they add to the beauty of the picture.

Of course, I am writing of experiences in the use of a hand camera in which the shutter is not controlled by a pneumatic attachment. If I have contributed any hints likely to aid a brother amateur, with a Waterbury, I am satisfied.

Geo. L. Sinclair.

THE STEREOGRAPH.

The writer has followed with interest the attempts of some "Annual contributors" of the past to infuse enthusiasm in readers for stereoscopical work. The little interest shown by the public in general indicates clearly enough, that the amateur has not as yet mastered this interesting part of the photographic art. Out of hundred amateurs questioned on the subject but one has ever attempted to make any stereoscopical pictures at all, while but from five to ten are conversant with the underlying principle. And yet there is nothing so realistic as a good stereoscopical picture, and it requires but the true rendering of colors to be taken for nature itself. It demands of course, like everything else, a proper understanding of the best conditions to get the best effect, and this applies especially to the selection of the subject. I have been trying to find the reason for this lack of interest, and attribute it to three causes which are:

1. The public in general shows no appreciation for such photographs, either possesses no stereoscope to view the pictures with, or if it does, simply perceives the enlarging effect of the lenses without waiting to catch the real perspective.

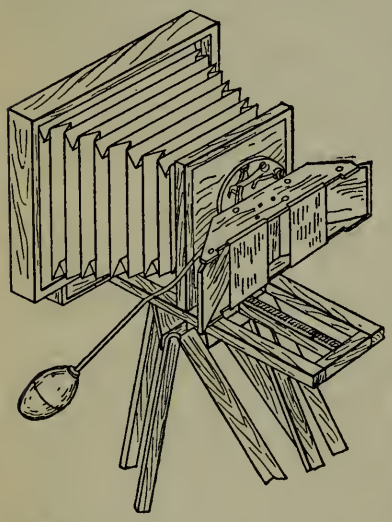
2. The work for taking stereoscopical photographs and printing copies is more than that required for ordinary photographs.

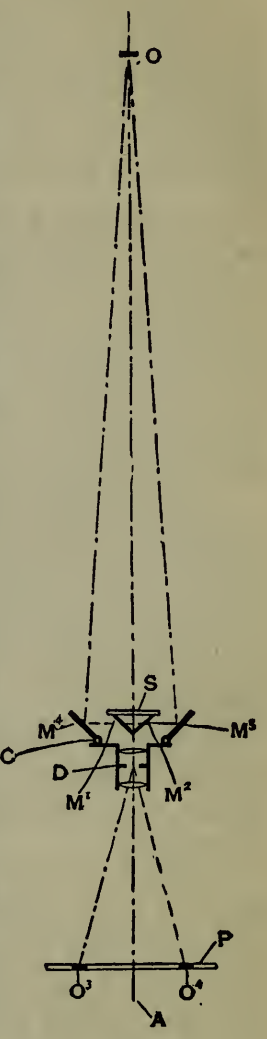
3. Special apparatus is required, consisting either of a double camera or a single camera with a set of matched lenses with dividing screen and duplex shutter for instantaneous work.

Objection No. 1 will fall by itself as soon as the amateur takes it upon himself to educate the people to the beauties of stereoscopical pictures by producing plenty of them. Objection No. 2 will never entirely be removed unless a great demand creates special labor-saving devices. The third objection is really the greatest of all. An amateur possessing for instance an outfit for taking 5 by 8 views, and a high-priced lens finds the ordinary running expenses big enough to prevent the acquisition of an extra set of matched lenses. While a set of cheap single lenses may be used for ordinary landscape work with time exposures, the tendency is to get the very best or nothing at all. I have been engaged for the past three months in developing a little apparatus which, when attached to the front of an ordinary camera would permit the taking of stereoscopical photographs by using only one, and this the regular

lens. Although I have not decided upon the final shape of the apparatus, my experiments even with crude apparatus have been so encouraging that I have decided to furnish the readers of The Annual with a description:

The stereograph consists briefly of a set of four mirrors mounted in a suitable frame. The first two mirrors are directly in front of the lens, forming a right angle with each other, and an angle of 45 degrees with the optical axis through the former. The second mirrors are parallel to the first and is their relative position best seen in accompanying sketch. *A* represents the optical axis, *P* the sensitive plate or ground-glass, L the lens with diaphragm, *D*, *M*1, *M*2, *M*3 and *M*4 the four mirrors, *S* a shield and *O* an object to be photographed. Mirrors *M*3 and *M*4 may be rotated around centers *C*. A ray from object *O* will strike first mirror *M*3, then be reflected to mirror *M*2, then reflected pass through lens to sensitive plate and make the picture *O*3. Another ray, however, will strike mirror *M*4, and passing through *M*1, *L* finally produces picture *O*4. We have, therefore, two separate pictures of the same object on the same plate side by side, which differ from each other only in the manner in which an object seen by the right eye differs from that seen with the left. In the first model the distance between the two mirrors is not more than three inches, but on a later construction I have provided that the distance of the two mirrors may be increased to twelve inches if a far-distant object is to be taken. It is important that the mirrors be accurately plane, and if of glass silvered on top and not on back. If ordinary mirrors are used a quadruple reflection will be observed, the





thickness of the glass and angle of incident rays determining the distance of the different reflections from each other. By looking at sketch it will be seen that the two pictures cross each other on the negative and prints need not be cut in two for transferrence, which is especially valuable in the printing of transparent positives on glass. While the stereograph is best adapted for cameras for pictures 5 x 7, and larger, I propose to fit one on my No. 3 Kodak, and make enlarged copies. The instrument allows of a number of modifications, as for instance, substituting prisms for the mirrors or using but one set of mirrors which may be revolved around the optical axis, subsequent exposures being made; but is not my object of burdening the reader with unnecessary details. My model is provided with polished metal mirrors, to be replaced by plate-glass silvered on surface, weighs about a pound, and measures 7 x 2 x 1½ inches, and fits on a 5 x 8 Bausch and Lomb Universal lens.

To sum up: The stereograph will I hope stimulate the amateur to enter the field of stereoscopical work, the apparatus therefore being only a simple relatively inexpensive attachment to an ordinary outfit.

Hermann Lemp.

A SIMPLE PRINTING-FRAME FOR LANTERN-SLIDES.

Some years since a friend of mine had a valuable 8 x 10 negative, from which he desired to print a number of lantern positives.

He had no copying camera and no proper printing-frame. The camera, indeed, might not have helped him very much, for, like many other valuable things, the negative had been carelessly abused. There were several bad scratches near the edge, and, at one corner, part of the film had been gouged off by sheer force.

These things were annoying enough, but not irreparable, for the centre of the negative was all he absolutely needed to copy; still, on closer examination, it appeared that the camera must have been mounted upon a loose-jointed tripod, or the ground must have been boggy, for the horizontal lines of the negative were far from parallel with the edge of the plate!

After discovering this complication of annoyances, my friend A. was almost at his wits-end to obtain his lantern-pictures without much fussing and bother, for it was the "dog-days," and A. is not, unfortunately, as patient a man as the proverbial patriarch of Uz!

On maturely considering the matter, I was able to demonstrate an easy and accurate way out of his difficulty, certainly new to both of us, though, perhaps, *assez agée*, to more experienced amateurs, and so I mention it that it may be generally understood, and help others out of similar perplexities.

We first hunted up a piece of thick pasteboard, an inch or more larger everyway than the negative, and carefully marked upon it with pencil and square the dimensions of the lantern-plates in use, allowing an excess of $\frac{1}{64}$-inch in length and breadth to accommodate any plate that might be a trifle larger than their nominal size; then, with rule and sharp knife we cut out the parallelogram thus laid down, and now had a hole the size of a lantern dry-plate, cut out of our pasteboard as near as may be to the part of the negative to be reproduced.

Next, we laid our negative upon the pasteboard "mask" (as it really was) held both up to the light, and carefully shifted the glass until the exact field of view desired was seen over the hole, every line square and true, as we wished it to appear on the screen. Carefully holding negative and mask firmly in position, lest any derangement might occur, we laid all down upon the table and ran a pencil around the edges of the negative.

A few clips of the shears, cutting along the pencil marks, and our "mask" was ready for use, the pasteboard being carefully marked, so as to be sure which was "top" when printing began.

In making our positives we secured the mask to the face of the negative by a drop of gum at each corner, and left it to dry for a few hours under pressure; next we marked one corner of the opening to secure something to "register" against, and as a back-board we cut another pasteboard the size of negative and covered one side with a bit of black velvet.

All being ready, we took the frame into our dark-room; a lantern-plate was dusted off; laid face down upon the film of the negative in the hole in the "mask"; the velvet side of the back laid upon the mask and all fastened by two wooden spring clips. Then covering all with an opaque focusing cloth, we made the exposure by turning the gas up and down in the familiar way.

The positives were all good and would register well if necessary. Of course it was fortunate that no reduction or enlargement was necessary; otherwise the camera would be a *sine qua non*. The great advantage is, that you can be abso-

lutely sure that your positives are perfectly square and true, no matter how crooked the negative may be from a tilted camera, and the whole thing may be done much quicker than told.

I trust this absurdly simple dodge may help some one out of perplexity in a similar case.

Dr. N. B. Sizer.

PHOTOGRAPHY AND LITERATURE.

During the past few years I have given some attention to the science and art of photography. I have had experience with different plates and developers and methods of printing and presenting the finished results. In taking account of past hours in the dark-room, field and study, the question has arisen: What substantial residuum of profit is left, not left *in general*, but left to one whose daily occupation is the teaching of the Greek Language and Literature. There is much in many ways, as may be illustrated by the articles of college men in former editions of The Annual.

Recreation is something, and the illustration of authors ever so imperfectly done, and the relief afforded by plunging one's hands into things after dealing long with ideas only. Other forms of popular amusement do not satisfy. Some of them are good only for one season of the year; some require an inborn knack for success; in some the exercise is too violent; some end in knowing only and do not produce anything that can be looked at and shown to one's friends. Unlike all these, picture-making by photography is the relief and help of a worker in literature.

What is a poem or drama? A work of imagination and taste. And what is picture-making but imagination (image-making)? Last year a class in Greek read the *Iphigenia at Aulis* of Euripides. Like any drama it contains a number of pictures, some bold and strong, some pathetic, and some only interesting. Why are they so? For the same reason that some of my views on the Beaver River or on the seashore are pleasing. The foreground is strong and gives relief and a feeling of distance. Or there is balance and contrast and breadth and harmony and repose. At one time we could not tell why a certain choral ode pleased us all, but after some experience with faulty pictures of my own, I knew it was because the ode is not crowded with details and its contrasts are not "soot and chalk." Genuine art is one and the same

no matter where found. It is not that making pictures by the camera is necessarily art, but one does not go on bringing up views on the plate and printing on paper without experiencing some dissatisfaction with his own work. At this moment he is ready to observe the mass of help offered in magazines and books for finding out the causes of his dissatisfaction. In my own experience, a few months' enthusiastic picture-taking would have measured the career of this amusement had I not learned those universal principles on which a picture must be made if it is to be a permanent delight. It is true, these principles are involved also in the composition of the poems and other works of our great writers; but nowhere are they exhibited in such a striking and impressive way as in the make-up of a good picture. There is an immense gain from the study of these principles in the Annuals and magazines, and the books of H. P. Robinson and others. All this study and knowledge will react on the study of Greek literature—of any literature. It makes one observant of the method of the poet; and by helping him to see more deeply into the causes of literary pleasure, it adds to the enjoyment.

It is one of the best things said about photography that it has charms for persons of all ages and this for widely different reasons. Is it too much to say that its worthiest and most lasting charm is in the means it affords us for stimulating the imagination and stirring all those finer sensibilities which are the inlets to the soul of everything that is beautiful?

George Kennedy.

PRINTING-OUT OPAL PLATES FOR POSITIVES.

An excellent printing-out opal plate has recently been introduced,* to which I wish to call the attention of photographers, especially amateurs, as they will find it a very convenient means of reproducing their negatives in an attractive manner.

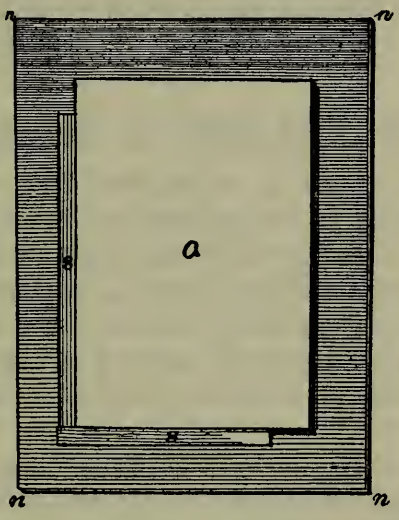
The opal plates are cleanly coated and carefully prepared. The film is of perfect white color, as sensitive to light as an ordinary chloride of silver gelatine emulsion paper; perhaps even more sensitive.

The printing is most conveniently done in a specially constructed frame so that the progress of the printing can be examined from time to time as when flexible substances are

* "The Luxotype," for sale by The Scovill & Adams Company.

used. But when such a frame cannot be had a scale photometre (with bichromated paper) may be employed to time the exposure in the first instance so that the same time may be given thereafter to the opal plates. Or, the plate itself may be lifted from the negative and examined if by means of a device, as shown in the cut, it is accurately replaced exactly in the same position after examination. This can be done by pasting on the negative n.n.n.n. two strips of thick paper or cardboard s.s., against which the opal plates are pressed before closing the printing frame.

The opal positives weaken somewhat in the toning and fixing bath, so that they should be carried a little further than ordinary albumen prints in the printing.



The printed opal may be toned and fixed simultaneously to almost any shade with the usual combined bath. The one described by Prof. Ehrmann,* on page 89 of THE AMERICAN ANNUAL OF PHOTOGRAPHY AND PHOTOGRAPHIC TIMES ALMANAC FOR 1892 has given excellent results. It tones slowly and therefore secures perfect fixation of the plate.

The formula recommended by the makers of the plate is as follows:

Water	32 ounces
Hypo	8 ounces
Chloride of gold	15 grains
Nitrate of lead	38 grains

* The formula is as follows: Dissolve 12 ounces of hyposulphite of soda in 48 ounces of water, and 2 ounces of alum in 20 ounces of water. Mix these two solutions and allow the combined solution to stand in an open vessel for three or four days. Then filter and heat to about 60 deg. F., and dissolve in it about 60 grains of chloride of gold.

I do not recommend washing the plate in pure water previous to toning, as the film is so extremely tender the action of water is likely to injure it. Prof. Ehrmann's combined toning and fixing bath, as given in the 1892 ANNUAL, contains a quantity of alum which prevents the softening of the film, and as this bath contains neither lead salts nor sulpho cyanates it is furthermore likely to preserve the delicate film than the bath recommended by the manufacturers.

In toning, the color of the opal changes first to a yellow, then becomes red in tone, and eventually assumes a beautiful purple, so that almost any shade can be obtained. I think an impervious varnish such as the S. P. C. Crystalline is excellent to use on these positives, as it not only preserves the film of the plate, but also really enhances its beauty.

Everett H. Wentworth.

FILMS, AND HOW TO USE THEM.

THE prominent position celluloid films now occupy in the photographic world is undoubtedly due to the advancement made in that line during the past year, and the easy way in which they can be handled, both as regards portability and development. Being so delighted with the success that I have had with them, and making the same known to our wide-awake editor, he requested me to tell my fellow-workers my mode of operation.

I will therefore tell you how I do it. In the first place, do not let it enter your head that films are awful hard to manage (that is to say the cut films made by the veteran John Carbutt); as regards other films generally used in roll-holders, etc., I have not one word to say. In the first place, we must consider the great advantage we have over glass plates as regards lightness. Just imagine yourself lugging two or three dozen 8 x 10 plates for several miles along a country road in this hot month of June, with the sun pouring down on top of you to the extent of 90 or 100 degrees, plates in one hand, and your camera in the other, with your tripod slung across your shoulder. This is what I did when I went to New Haven to photograph the Yale crew. I got to the boat house just in time to see them row away from the float, and make speedy headway up the creek where they do the greater part of their work. Well, the only thing for me to do was to tramp it around by the road to the scene of action, which is about three miles, and run my chances of getting on the coacher's launch. Now I had one

dozen film-holders, an extra long-focus "Beck" lens, as well as my regular 11 in. lens, and all fitted to an 8 x 10 Henry Clay camera, and with this stock-in-trade a man is fitted out to do anything, and as I made connections all right I was so delighted that I scarcely knew I had two dozen films with me, as they really are so light, and I tell you candidly it is a Godsend to any one going around as I do, whether it be for pleasure or business, to be able to fit himself up with such a comparatively light, handy, and ever-ready outfit.

If you want to do rapid work then use the "Eclipse" film, and on a good, bright, sunny day you can make an exposure of the $\frac{1}{100}$ part of a second, stop $f/8$ with the above-mentioned lens, and bet your last year's light suit against an imported Scotch cheviot, you have got the farmer's horse taking French leave over a five-barred gate to the next field of sweet clover (provided you have an athletic shutter attached). Now here is a greater combination than the greatest political bosses ever thought of. If your fancy turns to interiors or landscapes, why you should use the "orthochromatic" film, as they give you such latitude.

I was present at the funeral of the late Walt Whitman, and among other things I photographed was the casket containing the remains in the back parlor, with two gas jets burning, one enclosed in a yellow globe and the other in a blue globe, and a little ray of light coming from the front windows; now this was a job that had to be done quick, as the pall-bearers were ready to take away the coffin and put it in the hearse, so I exposed one "ortho film" on it for 4 minutes, and seeing I had a chance to make another while the undertaker was making some preliminary arrangements I exposed one 7 minutes, thinking to get one good out of the two, so when I returned I went to work very cautiously, and the result was that I got two good negatives, one a little under, and the other as near correct as you would wish to have it.

Now you perhaps may say What do you develop with? I will tell you: "iron and potash," and I stand ready to demonstrate that it cannot be beaten. It is nothing unusual for me to be asked what I develop with, and how I develop. Now developing is a matter which one must find out for himself, and I say, take any good formula, and stick to it with all your might, using the same brand of films all the time, and you will come out ahead, as the films are made of such uniform quality that you can depend on them, month in and month out. I have seen a great many printed instructions as to how you

should handle films in development; let me tell you the way I think is the simplest. Get two 8 x 10 dishes and one 11 x 14 dish, put about 12 ounces of developer in each of the smaller ones, and about twice as much in the large one, let the bath in the small dishes be a little weaker as regards its densifying powers than that in the large one. When this is all in readiness take your double holder and remove the film from one side and place in one of the small trays and flow the developer over it well, then do the same with the other film in the other empty dish. Now when you see them coming up, and about half done, place them in the larger dish, and so on until you have your two or three dozen all developed, as the case may be.

After they have gone far enough, rinse them under a good spray of running water, and place them in your hypo bath. When they are fixed wash them well for about three hours, and give them a weak bath of glycerine and water, and hang up to dry. This bath should be about 1 to 30, and rinse well after removing films from the glycerine and water, or your printing paper may stick to your film when in the frame. If you work according to the above, you may depend upon a good number of negatives, and be able to show us in our valuable ANNUAL of '94 that you can do just as well as the best of us.

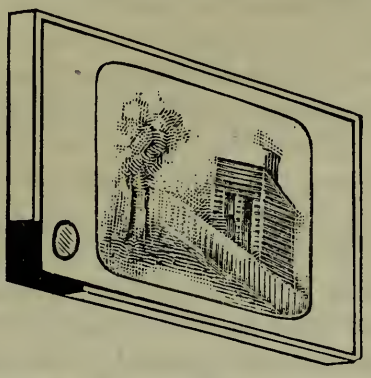
J. C. Hemment.

RIGHT SIDE UP.

THE lantern operator exhibiting slides and finding a score or more coming along regularly each with its spot in the same corresponding position, is lulled into a sense of security and probably neglects to watch for this indication. Suddenly this victim of misplaced confidence is confronted on the screen by the picture of a staid matron standing on her head, or that of a church acrobatically poised upon its spire. The kind of mirth that this provokes is usually not agreeable to either lecturer or operator.

To prevent such antipodal effects, I have adopted the plan of using white binding strips, and either painting the spot corner black or pasting thereon a small piece of black paper. When properly arranged for exhibition the slides show an uninterrupted black band along the spot edge; should one or more perverse pictures turn upside down or wrong side to, the solution of continuity in the band catches the eye at once and compels immediate correction of the error.

Black binding with white corners would answer almost as well, but white binding is preferable, the general appearance is rather neater, the slide is better seen in the dark, and it is also



easier to mark lines of varying thickness and spacing along the edge, to distinguish and more readily pick out any desired set from a lot.

Frank La Manna.

A USEFUL COMBINATION FOR THE MAGIC LANTERN OBJECTIVE.*

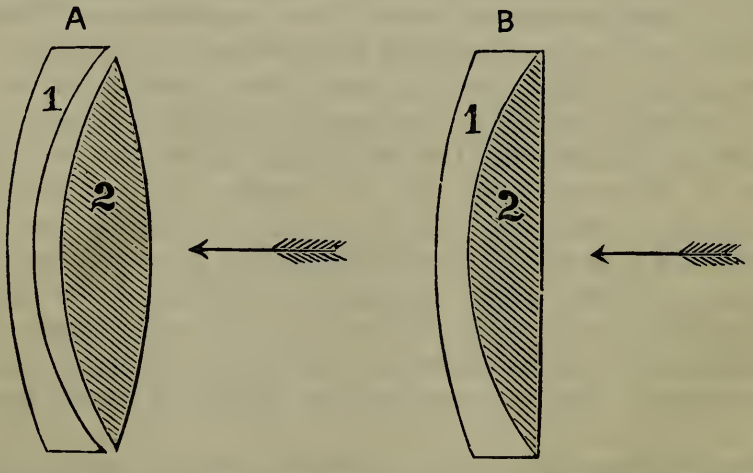
There are but few comparatively that own a magic lantern and at the same time have the requisite number of projecting lenses to meet the requirements of different sized rooms and screens. The result is they worry along to the annoyance of their audience and the sacrificing of their pictures. Professional lecturers often find that another range of powers between what is known as a one-half and a four-four lens is needed but it is not in market and so must be done without. The amateur, if he purchase a first-class lantern finds it supplied with a one-quarter objective which with the lime-light alone will give a picture ten feet square at twenty distant from the screen, while with the oil light a picture eight feet square is all it ought to be made to do unless the illuminating power and beauty of the picture is sacrificed. Oftener the quarter sized objective will give pictures somewhat larger than these figures, so that in either case the lantern generally has to be placed too near the screen and in the midst of the audience or room to the annoyance of all concerned. The most useful lens doubtless would be a one-

* The writer, with no other interest to serve than the good of the public, will answer any question relative to opticians, price, etc., that the reader may desire. 88 Water Street, Newburg, N. Y.

third, and should be ordered with the lantern; this gives a twelve-foot picture at thirty-six feet from the screen. But suppose we have only the one lens and this is the one-third objective, the one-half-sized objective giving a nineteen foot picture at fifty feet will at times be found a most useful lens. The three objectives would cost from thirty to thirty-five dollars, and if the instrument be a double lantern this item is of much importance. Many operators in order to have more range of power remove the back lenses and utilize the front lens only, but the picture is so poorly defined that the result is a disappointment. For several years the writer has made use of a combination that gives very fine definition and illumination and at the same time calls for only one tube or objective. All that have adopted it are pleased with it, and have had no use for the cumbersome, costly, and weighty outfits of objectives.

Select, for example, a one-third Darlot, or a lens of about five and one-half inch focus. Unscrew the back combination and remove the lenses, retain the concave lens in the same place, that is on the outside of the tube, now substitute in place of the convex lens a plano-convex with a less magnifying power than the original one, and we increase the distance from the screen without an increase of the size of the picture, so that in the same objective one may have a range from a one-quarter lens to a one-half by this simple change, and the pictures of such a quality that the slight want of definition at the margin will not be noticeable to the ordinary observer.

The following illustration will aid the reader to a more clear understanding of the matter.



A represents the back combination of the projecting lens

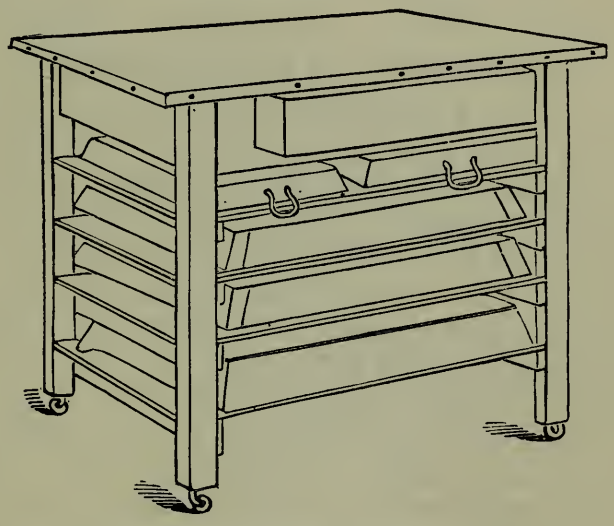
for the lantern. *B* shows the combination suggested with the plano-convex lens, 2, in place of the double convex 2, *A*, while figure 1 of *A* and *B* represents the flint-glass or concave lens referred to. The arrows show the direction of the light from the condensers or source of light. In *A*, 1 and 2 are separated by a ring. In *B*, 1 and 2 may be close together or separated as will give the best results on trial.

Rev. Dwight W. Smith.

A CONVENIENT TABLE FOR THE DEVELOPING-ROOM.

The various phases through which the style of furnishing the developing room has passed during the experience of most of the older workers in our profession has doubtless taught, either by observation or experience, many lessons which it would be well to remember.

Fortunately, most of the crowded dusty holes which were in former days called "photographer's dark-rooms" have been cleaned out and refurnished; bringing great relief from



dirty pin-holed plates, and no little improvement in the moral character of the operator. A well-regulated establishment should have a chemical or developing room free from bundles, boxes, closets, or even shelves; except just enough to hold the chemicals in actual use for the work in hand. It should *not be a storeroom.*

A few small shelves near the sink should suffice for holding bottles of developer, measures, tests, etc., while the actual work may be done on one or more tables constructed upon

the plan shown in the accompanying illustration. The general plan of the table is similar to those known in the furniture trade as "kitchen tables."

The top is covered with a rubber cloth and the legs provided with castors, across the legs are fastened strips for holding light shelves upon which washing, toning, and fixing trays are kept. In a drawer small dishes, pans, and stirring rods for experimental work are kept; on such tables plates may be cut, holders filled, and any proper work for the room done. In case a large number of pans are in use for special work space may easily be made for them by laying a board of proper length between two such tables placed at proper distance apart.

By such furnishing, work can be done by the sink or near a window, or some obscurely lighted part of the room; and the tables are easily moved when cleaning the floor. After long use of such a developing room I am led to believe that a trial of its cleanliness and convenience would be convincing to any careful operator.

O. G. Mason.

THE GENIUS OF PHOTOGRAPHY.

While the arts and sciences generally have been symbolized in many forms and varied conceptions, the ideal of photography has only once been effectively embodied—and that in the fine bronze, the "Genius of Photography," now in the possession of Mr. Thomas W. Smillie, of the Smithsonian Institution. The "Genius of Photography" is a bronze statuette, eighteen inches in height, representing the majestic semi-draped figure of a woman, crowned with the coronet of a gilded sun.

The flowing drapery is lightly caught with the right hand and falls to the feet in graceful folds, while the left hand, resting on a half column, holds a photographic lens. On the face of the column are graven, thus, the names:

Porta.
Nicephore-Niepce.
Daguerre.
Talbot.

Niepce de St. Victor.
Lafon de Camarsac.

while at its base rests a chemical retort. The figure has an exquisite beauty in its proportions, outlines and modeling; a



D. F. Fairchild, Photo.

Stevens & Morris, Engravers.

A CATSKILLER.

wonderful dignity in its calm pose, and the grace of its suggested motion. The only inscriptions other than the names on the column are on either side of the base and read "L. Cocheret," and "Commandée par M. Disdéri." There is no date.

It would be difficult to imagine a more perfect ideal of the science or art of photography than this—the symbols of light, optics, and chemistry, in combination with the majestic and beautiful figure, and the immortalized names of the great photographic discoverers.



The history of this unique statuette and the story of its late discovery are somewhat curious.

On a recent visit to Paris it was my custom to haunt the dingy old shops and book stands along the quays, on the chance of stumbling upon any "photographiana" of historic interest or value, having been commissioned by the United States National Museum to collect material for the photographic section. Knowing the French tendency for "specialists" in everything, I one day enquired if there was any establishment where the dealer made a specialty of selling old or second-hand photographic belongings, and was directed to an obscure little shop in a side street off one of the quays. While the dealer had nothing just in the line of my search, still there was a fine bronze—not for sale—now standing on his dining-room mantel, which might interest me. He would get it, and, with a stream of voluble French trailing after him, he disappeared through a staircase into the upper regions, and soon reappeared dusting a bronze statuette with his shirt sleeve. It was "La Genée de la Photographie," he informed me, and absolutely unique, having been made by Cocheret, a famous

sculptor, at the command of Disdéri, then at the height of his fame and popularity as photographer to the Imperial Court and the celebrities of Europe generally. Disdéri, he continued, having made an immense fortune, spent it lavishly, and at great cost ordered the statuette as an ornament to his gorgeously furnished studio, the mould having been broken after the first bronze was cast. Reckless expenditure brought Disdéri to ruin, and, at the sale of his effects, the dealer bought in the statuette along with a miscellaneous lot of studio belongings. Under persuasion, and, with great reluctancy, he would consent to dispose of it for very much less (as he contended) than its original cost, and after the usual comedy of bickering over the price, I obtained the bronze. Under the terms of their appropriation the statuette was not available for the Museum section; so, it thus became private property.

Frances Benjamin Johnston.

A SIMPLE METHOD OF BACKING PLATES.

For the prevention of halation it is necessary to back the ordinary gelatine plate. This can be done in the following simple way:

Make up a solution of ordinary powdered asphaltum in benzole, about 1:25, and then flow the same carefully on the back of the plates to be used—flowing as one would collodion—that is, not allowing the solution to run over the edges. The coating drying immediately, the coated plate can be put directly into the holder without fear of soiling the same. Before developing such backed plates take a small piece of rag or sponge, drenched with benzine or turpentine, and remove some of the asphaltum coating, by means of rubbing the rag or sponge gently over the centre of the backing of the plate. This will permit one to judge the density of the negative while developing. After having fixed the plate the remaining asphaltum must be removed by means of benzine or turpentine. This operation is performed by daylight. Backed plates should receive nearly double the exposure of unbacked ones for obvious reasons.

Alfred Stieglitz.

PHOTOGRAPHY IN HOT WEATHER.

PHEW! The editor is calling for an article. Think it better I give one on the (Russian) Bath process, or perhaps something on Ice Berg Photography. It is all very well under proper conditions, to write an article, but to try experiments in order to verify your position, during such weather as this, when the film beautifully dissolves and smoothly glides down the sink, is not conducive to the best of feelings.

Again, one develops such an amount of moisture that even one's linen wilts and fades away. Therefore, keep everything cool—set developing and fixing pans in some kind of a receptacle holding cracked ice—otherwise lay over developing until cool weather.

A friend of mine procured a butter firkin, around the inner side of which he coiled a rubber hose, and filled the centre with large pieces of ice—by making a connection with the Croton he obtained a stream of cold water and thus could proceed with his work.

Many overlook the fact that the hypo solution is warm, and no provision is made to keep it cool, and, as a result, plates taken from a cool developing solution will frill, pucker or melt in the warm hypo solution. Keep it cool, also, and—keep cool yourself!

Henry Clay Price.

THE HELIOCHROMOSCOPE.

ONE of the most striking novelties of 1892 is the heliochromoscope of Mr. F. E. Ives, which was first publicly exhibited at the Royal Society in London in May.

By means of this instrument, about the size of a table stereoscope, used first as a camera for making the photograph, and afterwards, slightly modified, as an instrument for viewing it, the reproduction of the natural colors by photography is actually accomplished, though not in exactly the way in which most people have expected it.

It is one method of carrying out the system of color photography known as composite heliochromy, which was originally suggested by Henry Collen in 1865, and improved upon by Du Hauron and Cros, but only recently made successful by Ives' labors in conforming the procedure to the modern theory of color vision. Although only a single sensitive plate is used, and a single exposure made, as in ordinary photography, the

heliochromoscope camera produces three images (upon the one glass), representing the effect of light upon the three fundamental color sensations; and when this picture is seen through the same optical system, the three images are combined again into one, which no longer appears like a photograph, but like the object itself, seen through a lens, with all the natural colors.

The result is really wonderful. To quote from a London newspaper, "it appears more marvellous than anything in a juggler's bag of tricks."

Mr. Ives, in a paper read before the Society of Arts, on May 25th, concluded as follows: "I would like to say another word to emphasize the fact, which I think is quite sufficiently demonstrated in the heliochromoscope, that although we are not able to make photographs in natural colors of exactly the kind that people have been looking for, we have nevertheless found a true solution of the problem of reproducing the natural colors by photography, as remarkable in its results as the telephone or phonograph, more perfect in the illusion of nature than would be possible in colored pictures, and almost as easy to realize as stereoscopic photography. It seems to me that this is an advance so great that it should finally break down the prejudice against the idea of composite heliochromy which has grown out of the long series of failures of unscientific, complicated and unpractical methods. With no more operations than are required to make an ordinary photograph we now make a photograph that, as we are able to see it, reproduces nature itself, light, shade and color."

W. I. Lincoln Adams.

STRIPPING FILMS FROM ORDINARY PLATES.

Professor W. K. Burton gives instructions for stripping films from ordinary plates, which suggested some valuable ideas to me. Every photographer knows the vexation of having a negative crack in the printing frame, and the thought has often come, "if I could only strip the film on to a clean glass!" I had a general idea that hydrofluoric acid would release the film, but the difficulty of getting it, and the fact that I had never seen it recommended, prevented any great effort.

Professor Burton advises to coat the plate with a quite thick film of collodion, and when that is set, to immerse it in a $\frac{1}{4}$ per cent. aqueous solution of the acid. I tried his plan and barely saved my negative, with from two to three hours' fussing,

owing to the fact that the film curled all out of shape, and got torn quite badly.

After some experimenting, I can now, in about fifteen minutes, change a film from one glass to another, without any damage whatever and without even removing the retouching.

Supposing it is a five-by-seven plate. I get an old negative and lay six or eight little bits of beeswax on it, one on each corner, and some more where the crack will come when the broken negative is laid on it; then I carefully lay the negative to be stripped on it face up; by applying a gentle heat the wax is melted and the two plates fit closely to each other, and upon cooling adhere firmly. I then in a 5 x 7 *rubber* dish put two ounces of alcohol, one of water, and a few drops of hydrofluoric acid; the plate is immersed in this and rocked gently; in a few minutes the film can be rubbed up at the edge, I loosen it with a toothpick along one edge and with my fingers push the film over a little at a time, until I have detached it completely from the plate. I have another dish ready with alcohol and water in *the same* proportions and the clean glass in the bottom of it. The film is pliable but not at all tender, and can be readily lifted from one dish to the other in the shapeless roll in which it was pushed off the cracked plate; it can then easily be straightened out, adjusted in place, bubbles expelled from between it and the glass, drained and set on the rack, where it dries quickly. Before setting it away I mop it off gently with a clean soft handkerchief, for fear tear drops might form.

The plates strip nicely in an aqueous dilution of the acid, but the films stretch about one-sixth larger, and are somewhat difficult to handle in warm weather. I could not make them strip at all in an alcoholic dilution, as the film was not sufficiently pliable. I found moreover that in dry weather with the proportion of alcohol and water I have given, the film contracts a little, so more water should be used. If the negative is coated with a collodion varnish I let it soak a little in the alcohol and acid and add the water later. If a shellac or gum varnish of any sort has been used, I think it would be best to remove such varnish before trying to strip.

The quantity of acid used is so slight that I did not consider it necessary to wash the film at all, and negatives treated so have stuck perfectly, and in months have shown no sign of deterioration. The action of the acid is on the glass, not on the film.

I found the acid in one-ounce gutta percha bottles at a

wholesale drug store; those not having access to wholesale houses can get their stock-house to procure it for them, as I notice these same bottles of hydrofluoric acid are listed at forty-five cents by the manufacturers.

Look out in using the acid not to get any of the strong stuff on the skin, as they say it makes an ugly wound which shows little inclination to heal. I find no harm comes from the very dilute solution recommended. I use 10 to 15 minims of acid to 3 ounces of alcohol and water, and the graduate I measure in is coated with beeswax.

R. W. Harrison.

THE PRACTICAL EXPERIENCE OF AN "OLD TIMER."

What I here relate may not be new to "old wet-plate" men, but the frequent applications I have had of late for information on the points I refer to, induces me to repeat them.

Although the dry-plate is now almost wholly used for portraits and views, the *wet* is essential for tintypes and mechanical and commercial work.

The Bath and its Management.—For this pure water is *absolutely* necessary. To obtain which, take ordinary drinking water, in large white glass bottles, add about 1 grain nitrate of silver to the ounce of water, and enough saturated solution of sal soda to make it faintly alkaline, or as near as possible to the neutral point, shake up, and place in sunlight, all impurities will be precipitated in brown sediment.

Take of this water a quantity sufficient for your silver bath. Add silver until it will test 80 grains strong. Add iodide of silver (see text-books to prepare) until it remains permanently milky. Keep a stock of this on hand for future use.

Take of this stock and reduce with your purified water to 40 grains to the ounce. Add a few drops sal soda solution, shake, place in sun until clear.

It is now ready for use, and if kept at a temperature of 70 to 80 degrees, will, with good collodion work, nearly as rapid as the dry-plate, quite as quick as Carbutt 16 sen., and give you more brilliant detail than is possible to attain with any dry-plate I have tried.

For tintypes 30 grains to the ounce, or even 20 grains will be strong enough in hot weather. Never let your bath below a temperature of 55 or 60 degrees. I have used a bath at 130 degrees, when if the plate is used as soon as coated, will work

as rapidly as Cramer 60 sen. The plate must not be allowed to stand, or it will dry in streaks.

The most convenient temperature is 60 to 75 degrees. Keep a supply of bath solution on hand sufficient for two or three baths.

When from use the bath does not work clear, add (at night) a few drops saturated solution sal soda, stir up until milky looking. Let stand over night (longer if convenient). For convenience keep a 2 or 3 ounce bottle saturated solution sal soda on hand in dark room. Also the 80 grains stock silver, to strengthen bath when necessary.

Always use larger dishes than the plate, and never allow the plate to go within three inches of the bottom.

If by long standing the bath solution gets too strong, add of the *purified* water to reduce to 40 grains.

For the last ten years I used a bath and collodion. I never boiled or filtered them, only kept neutral, and at a temperature of from 60 to 75 degrees.

At bottom of bath dish keep an inch or two of pounded glass for the sediment to lodge in.

Never allow temperature to get below 55 or 60 degrees, or the iodides will be precipitated, and float about in the bath, and adhere to the collodion film, causing innumerable "pin holes." A bath in this condition if heated to 75 or 80 degrees will again work perfectly clear.

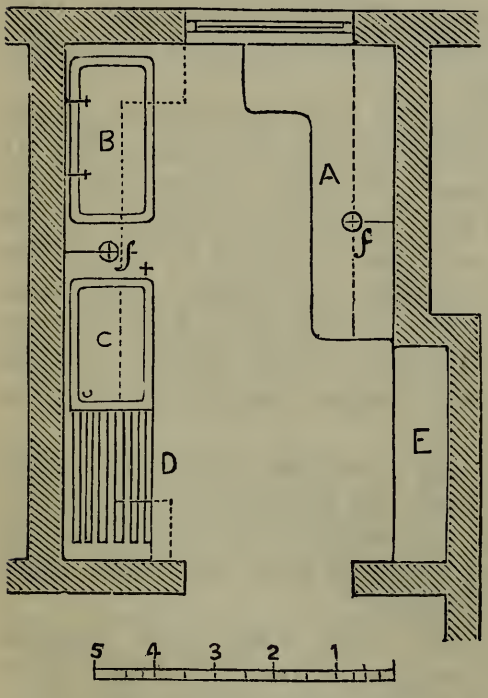
If no other means is at hand to keep the bath at proper temperature, make a box of sufficient size, with slats about six inches from the bottom, on which the bath dishes can rest. Let bottom be a large shallow pan for holding water. Below this place a lamp or gas jet. Let the box have a tight cover, through which holes are cut to admit the baths. Also insert a thermometer to give you the temperature—keep up the warmth night and day—as if allowed to get cold it will take several hours to heat up, and still longer for the freed iodine to be absorbed.

A good plan is to always use a curved dipper, the plate placed collodion side down, and any sediment floating will lodge on the back of the glass. Have holes in the upper end of dipper in which to insert a peg to keep the plate from going to the bottom of the bath dish.

For Clean Plates.—To insure clean glass and tintypes always albumenize. Take the white of one fresh egg to 30 ounces of water, beat up and filter, pour this on the plate while wet. When dry they can be stored for future use, always ready. *Alex. Hesler.*

A PRACTICAL AND COMFORTABLE DARK-ROOM.

A POOR workman, it is said, finds fault with his tools, and it is written that a clever one will do good work with poor tools. I think, however, it will be conceded that the best workman can only do himself full justice with the best to aid him, and, similarly, even the poorest do better. In a former ANNUAL I have given a description of several improvised dark-rooms created out of odd corners, closets, and bath rooms, in which my friends and I turned out lots of work with good results and with but little seeming discomfort—it was so happy to have a place at all to develop in. It has only been during the past year I have found out what happiness really means in a thoroughly practical and comfortable dark-room, with good sinks, lots of shelving, good light, and a whole dark-room, and nothing else, where no one enters who is not a photographer. As it takes but little room out of the house, was not expensive in its fitting-up, and, though small, quite roomy enough for all purposes in its economy of plan. A description of it may prove useful:



A. Developing table.
B. Sink with hot and cold water.
C. Negative washer.
D. Drain board.
E. Shelves.
f. f. Gas fixtures.
Dotted lines, shelving over sinks and table.

This room was originally a store-room connecting the front basement roomwith the kitchen, and as shown in the plan

above is about six feet six inches wide by eight feet six inches long. It was easy to connect the sinks to the house-plumbing, as the pipes to the kitchen ran along almost directly under the floor, as they do in most houses. A door between this store-room and the kitchen was removed and the space built up, leaving a window in the upper part, the sash being glazed with two thicknesses of light ruby glass, ground on the inner surfaces. The door to the front basement, a billiard room, was altered by removing the upper panels and glazing them in similar manner. For the sake of picturesqueness on the billiard-room side this glass was leaded in a quaint pattern, making the door rather an ornament to the room. This with the opposite window in the dark-room gives a perfectly safe light, of good volume to work by in the day-time. For the rest, the plan really explains itself. The two gas-brackets are fitted with the Aladdin fixtures and illumine the room at night in every corner, the one on the right hand being at a convenient height directly over the developing table. I believe more plates are spoilt by poor and insufficient light in the developing room than from any other cause. Hot water in the one sink, in addition to the usual cold supply, is a great comfort, and being so near the kitchen sink runs hot at once, and is a most time-saving convenience not only in washing developing trays, graduates, or anything else about the dark-room, but in making solutions. The negative washing sink has the inflow from the bottom and the overflow at the top. The Scovill adjustable washing racks are simply dropped into this sink, and the plates allowed to wash themselves for any period. The water supply in the other sink allows an uninterrupted use of water through every other phase of development, and requires but a turn of position from the developing table, without moving a step. I need not speak of the joy of unlimited shelving as shown in the plan for the storage of plates and negatives, bottles, graduates, trays, and all the impedimenta of the photographer, and all at hand. Ventilators are cut in each end wall under the ceiling, to secure a thorough draft and keep the room fresh. I might add that the developing table is fixed at a height to allow of my *sitting down* comfortably while developing, as I believe in very slow development, and this feature materially adds to the comfort of this very practical dark-room.

H. Edwards-Ficken.

LONG-DISTANCE PHOTOGRAPHY.

There has been much interest expressed of late about the recently constructed forms of lens combinations by means of which distant objects can be photographed upon an enlarged scale with a camera of moderate dimensions, and the pages of the various journals during the year have given much space to the subject. This interest is very natural, for nearly every photographer has felt at times the desirability of securing such subjects when the possibility of a near approach has been prevented.

It is an open question, however, whether the various forms of the tele-photographic lenses really accomplish this object to the degree which has generally been supposed, and it may be worth while to examine briefly what really has been done in this direction.

To do this let us consider what actually takes place in a camera under ordinary conditions. The rays of light from all parts of the object enter the camera through the lens and being deflected from their original directions unite to form an image of the object, this image usually being much smaller than the original, and its size being dependent upon the focal length of the lens, or in more general language, upon the extent to which the rays are bent from their original direction.

This image, of whatever size it may be, is formed without regard to the existence of a surface upon which it can be seen, and exists just as completely whether surrounded by the dark chamber of the camera or in the uninclosed space behind a bare lens, and although the back of the camera may be removed the image is there, although invisible, just as truly as if a ground-glass were there to receive it for the eye to see. This fact must be kept clearly in mind, and can readily be appreciated by using a clear glass in the camera instead of a ground-glass, and examining the image with a focusing glass or lens. The focusing glass cannot produce an image but it does reveal the presence of the otherwise invisible image upon the surface of the clear glass.

When the tele-photographic combination is used, the action really consists in applying an enlarging device to this image, magnifying it before it reaches the plane of the ground-glass, and the practical result is that only a portion of the enlarged image can appear upon the same-sized plate, and the effect is that of a great reduction in the distance between the camera and the object. This may in many cases be desirable, but it

will be seen that it is really not different in principle from any other method of making an enlargement. We are not actually brought any nearer to the object, but we have simply carried on the operation of making an enlargement simultaneously with the production of the original image. In other words, such pictures are not, strictly speaking, "direct" pictures of the chosen subjects, and ought not so to be considered, but are really "enlargements."

If the results of this method of enlargement are found to be better than those obtained by the production of a small original which is subsequently enlarged in the studio, the process may rightly claim to be considered as an improvement, but the expediency of transferring the operation of enlarging from the work-room to the field appears at present to be doubtful. A comparison of advantages and of disadvantages may be made and a kind of balance struck, and from this the desirability of using the newer method examined.

Assuming the definition of the original lens to be perfect, there is no reason why any enlargement of the image in the camera should not be, theoretically, equally perfect, while an enlargement made from a negative, or from a positive on glass or on paper introduces the possibility of granularity which is independent of the original degree of sharpness. Another advantage lies in the saving of time and trouble in producing the enlarged negative by the single operation of development, instead of requiring the subsequent work of projecting with enlarging camera and developing the enlarged picture. Beyond these points there is apparently no gain by using the new method.

The objections are also to be considered. Among these we find the greatly increased influence of vibration of the camera. We are working at the short end of a very unequal lever, and the slightest tremor is magnified to an extent almost ruinous to the result, and any camera built for increased stability becomes bulky and heavy.

It must also be remembered that the production of the enlarged image in the camera necessitates the prlongation of the exposure at least proportionate to the square of the degree of enlargement, so that an image of double size requires four times as long an exposure as the direct photograph; and one of three times the size an exposure nine times as long, thus rendering the influence of wind and vibration much greater than is apparent to the eye.

Atmospheric influences become of almost controlling import-

ance and a slight haze, almost imperceptible to the eye or upon a direct photograph, will produce most injurious effect upon the enlargement. With these comes also the necessity for selecting accurately the exact portion of the view to be enlarged, requiring most careful and accurate composition in the camera, while the direct negative is available for repeated operations of enlargement for various portions or for various results should the same be necessary. This is an important consideration, for the actual view must be left behind, in many cases never to be revisited, while the sharp, direct picture of the whole is preserved for many subsequent uses.

The new method may be developed ultimately into one of permanent value, but as it now appears the subject may be reduced to the question of the best place to make enlargements, viz.: in the camera, direct, or in the work-room, as a subsequent operation. Experience may show the true solution of the question beyond doubt, but until such experience has been gained most photographers who use the new method will also take a direct unenlarged negative of the same subject, as a resource in case of dissatisfaction with the enlargement, and this precaution is at least prudent.

Henry Harrison Suplee.

FILM NEGATIVES.

Three years ago, planning a trip to Quebec, I turned my attention to a substitute for glass-plates. I intended to use a Scovill 5 x 8 camera that had been my companion on many a mountain ramble, and, after having it fitted with suitable carriers, I purchased a stock of Carbutt's celluloid films. They came in paper packages easily stowed away in one's valise, and a gross of them was scarcely of perceptible weight.

To say that I was delighted when the moment for development came would hardly do justice to my feelings. At that time I used hydrochinon, and the results obtained were highly satisfactory. I now develop these films with eiko cum hydro, adding perhaps a little more hydro than is called for by Carbutt's formulas. The only difficulty I find is in correctly estimating the strength of the negative, on account of the translucent character of the celluloid, and my rule is to give a little more time in the developer after it seems to be fully developed. Fixing must be thoroughly done, and for this purpose I use two fixing baths, leaving the negative ten minutes in

each. These films, of the higher grade, are very rapid, the celluloid having no retarding effect on the emulsion. I have made instantaneous pictures with them, that developed full of detail and with plenty of strength. However, I think the mistakes of the average amateur are mostly with exposure. To hit the golden mean is as difficult in picture making as it is in morals. Neither too much nor too little—how sensitive to time must one be who can do that in exposing a rapid plate. Here I find the Watkins exposure meter of incalculable service. It is certainly better to *feel* the time than to get it by any mechanical device, but this meter, above all others, will often give you some very valuable hints.

Printing from these films is as easy as from glass, and will be highly appreciated by the poor fellow who has used the curling, twisting, thin roll films, of which let all amateurs beware. I recommend the beginner to use aristo paper, with Professor Ehrmann's toning formulas, and, by the way, to make easier the mounting process "proceed as follows": After the print is squeegeed to the ferrotype plate, put a light coat over the back of gelatine dissolved in alcohol and water equal parts in which are dissolved a few grains of chrome alum. This keeps the print from curling, and prevents the absorption of paste.

Waste films after being cleaned of emulsion may be used for a number of purposes:

1. Take equal parts of alcohol and ether, in which dissolve celluloid film to saturation. This can be diluted in equal parts of alcohol and ether to make an excellent varnish for negatives or lantern-slides.

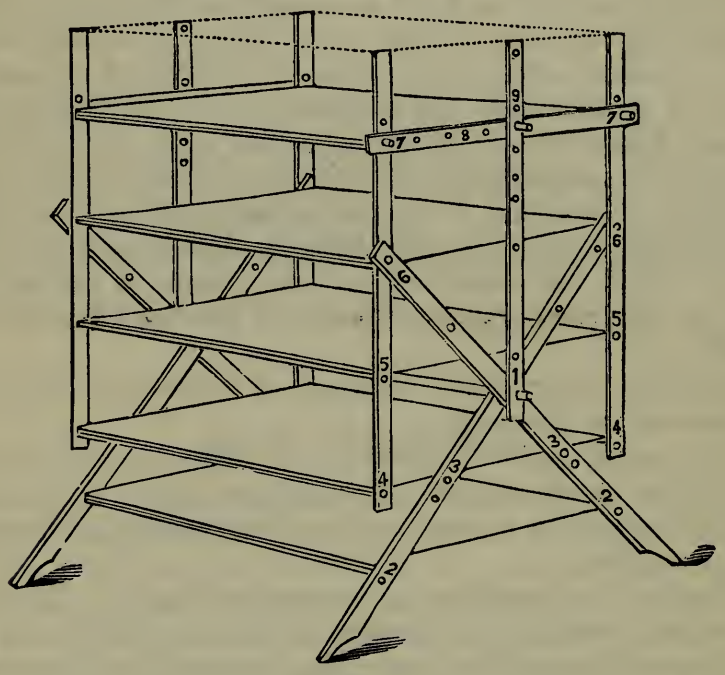
2. Dissolve to saturation in acetate of amyl. This makes an excellent coating for wooden dishes, impervious to water.

3. These celluloid films may also be used for vignetting, as follows: Lay the film over the negative and with a lead-pencil draw on the matt side a line around the image that you wish to vignette. Then with Prussian blue work a broad, wavy line over the pencil mark. From the edge of this line to the edges of the film paint heavily with Gihon's Opaque. This gives you an opening through a translucent medium that should softly vignette a weak negative. However, if the edge is not soft enough, take your brush heavily charged with Prussian blue and paint saw teeth a half-inch long from the edge around the inside of the circle. This will do the work, and you will be happy.

J. H. Bates.

A HANDY RACK FOR DRYING GELATINE ARISTO PRINTS.

GET four pieces ¾-in. thick, 1½ inches wide, 44 inches long. Bore a ¾-in. hole in one end of each piece ¾-in. from the end, and one hole in each 6 in. from the other end, also one midway between the two holes already bored. Put a ¾-in. rod 36 in. long through the centre holes—No. 1 in diagram—in each of the pieces, placing two pieces together at each end of the rod. Take two other ¾-in. rods 36 in. long and put one end through the holes 6 in. from the end—No. 2 in diagram—in each piece, one piece at each end of the two rods.

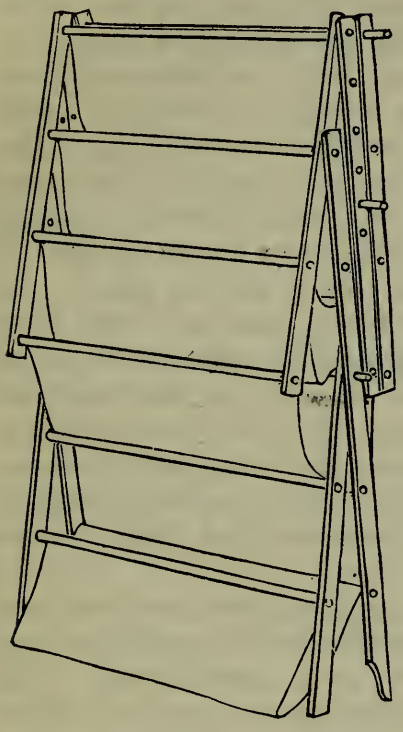


Drive small wire nails through these to hold the ends of the rods firm in the other pieces. Next bore two holes midway between the centre hole and the hole which is 6 in. from the end. Place in these two ¾-in. rods 36 in. long—No. 3 in diagram—and nail them fast. The centre rod should be nailed only to one piece at each end so that they will fold together like a sawbuck.

Next take four pieces ¾-in. thick, 1½ in. wide, 36 in. long, and bore ¾-in. holes in one end of each piece ¾-in. from the end, and one in each other end 8¾ in. from the end. Between these two holes bore two holes in each piece 8½ in. apart.

Put ¾-in. rods 36 in. long—No. 4 in diagram—through the holes ¾-in. from end, one piece on one end each of two rods, and nail. Put two other rods through the next holes—No. 5 in diagram—and nail. Put rods through next holes—No. 6 in diagram—in same manner but do not nail.

Put the ends of the last two rods—No. 6 in diagram—also through the holes in the ends of the first pieces put together, and nail the outside pieces fast to the ends of rods, leaving the other pieces free to move when the whole is folded together. Put two other rods through the remaining holes—No. 7 in diagram—same as others. Get two pieces ¾-in. thick, 1½ in. wide, 28 in. long, and bore one hole in each end of each piece ¾-in. from the end and one in the centre. Place the end-holes over the ends of the last rods put in—No. 7 in diagram—at right angle with the other pieces—No. 8 in diagram. Take two other pieces ¾-in. thick, 1½ in. wide, 28 in. long. Bore one hole in one end of each ¾-in. from end, and one in each 8¾ in. from the other end, and place hole ¾-in. from end on the centre rod—No. 1 in diagram—where the pieces cross—in the sawbuck part.



Put a rod through the centre hole—No. 9 in diagram—in the cross-piece and through the other hole in the end of the last piece which is upright to help make the whole thing more solid. Tack cheese-cloth to the rods and extend across and fasten to the other side, thus forming shelves which will receive and allow pictures to dry clean and free from dust, as the ends of the upright pieces will allow a cover to be thrown over to keep out the dirt.

J. W. Pendergast.

THE CAMERA IN THE ARMY.

I AM asked to say something of the use and uses of the photographic camera in the army.

For many years it was rare to find officers subject themselves to the annoyances the camera and bath put upon them, for our army was commonly the vanguard of civilization, so that transportation was costly and limited. This was a pity, for in the study of ethnology and cognate subjects the camera would have collected data of infinite value to science. Indian architecture, utensils, costumes and modes of life would have been painted by the magic of the sun, and left for information of future generations. But alas, the dry-plate and the quick shutter came almost too late for any of this sort of thing. The buffalo had gone, and "hand-me-down" clothing had come into vogue. It is a poor Indian who cannot wear clothing after the white man's pattern, and the art of painting the epidermis into an attractive and stylish suit is passing away.

Implements laboriously carved from wood or horn have gone to collectors' shelves, as iron spoons, tin cups, grain sacks, tomato and kerosene oil cans serve most of the functions of the barbaric domestic implements, while the Commissioner of Indian Affairs supplies blankets which supplant skins of animals decorated with marvellous skill in wonderful designs.

In nature too much would have been secured that civilization has swept away.

Now the camera is as common in the army as elsewhere, officers and many soldiers owning outfits, and the engineer and ordnance corps having cameras for their special work. All expeditions are supplied with the hand camera, and dry-plates, which make the sketches illustrative of the scenery on many a new and perilous journey.

Of the military uses of photography, of course it must be apparent that map-making and long-range lens sketches will be most important. In our vast and new country it will be a century before the topography will be worked down to a permanent state so that Von Moltke maps can be kept on file. Maps will include the major details, but for military purposes, sketches showing incidents of the locality must be made by reconnoisance and scouting parties, and the camera will doubtless rise to the occasion and do much of the work. Sketch maps for use of heads of columns, commanders and reconnoisances are most readily multiplied by some form of photographic process, as they were during the Rebellion.

The use of the camera in surveying is an alluring field for invention and experiment. While in a limited area with suitable marked characteristics wonderful work is done with camera or "camera obscura," it is rare that good detail can be secured at any considerable distance. The telescopic lens uses the visual rays of the spectrum and only the axis of the lens is useful. With the photographic lens the visual are sacrificed to the more refrangible chemical rays, so that visual definition fails rapidly with distance, and at present photographic surveying is not making rapid progress.

The use of the camera either for mapping or for making a transitory picture of a harbor is an attractive subject to artillery officers.

An editorial in the New York *Sun* states: "The curious invention of Captain Fraysseix of the French navy, called the *tir optique*, bids fair to create a complete revolution in modern artillery." * * * "The invention consists in the application of the 'dark room' to the operation of aiming. The image of the object to be hit passing through a lens is reproduced on a screen. The pointer looks at this image just as the photographer would look at an image on his ground glass," etc.

If from the top of steel conning towers at suitable positions overlooking the harbor, cameras can be placed to show the entire harbor, or the channel in the field of the guns placed to protect it, it must be manifest that every incident can be depicted on the focusing screens in the towers, and the position both in distance and direction of any hostile ship or boat would be revealed.

This form of "position finder" if it can be made in practice to fulfil the indications of theory, would be all that could be asked for. A sensitized surface laid on the table would give a record of these events at the moment, while the conning officer would have before him a positive location of all incidents before him, and direct the fire of all the guns with great accuracy. Spherical aberration interferes with accuracy. With the long ranges of modern ordnance sphericity of the earth is to be considered as well, so that where greatest accuracy is required the least is attained. But we can hardly tell what is in the future.

Photographing shot in motion is quite successfully done. *Outing* has printed some successful pictures, showing the projectile from 3 to 12 calibres long. But this was with mortar shells.

Abroad with the aid of electricity to give light and to measure the intervals of exposure, the motion of the projectiles is being studied, and many of the laws as to motion of vessels in water are found to have their visible counterpart in the rapidly pointed bullets moving through the air. Stream lines of air particles are seen to part in front, eddies are formed at the base like the rushing water about the stern of a ship. The lens gathering much light, with the electric flash giving actinic light quickly, seem destined to do wonders in the future in this sort of research.

J. W. MacMurray, U. S. A.

A MEANS OF LESSENING SHUTTER JAR.

Jar is an accompaniment of the use of nearly every shutter in the market. When the jar occurs only at the end of an instantaneous exposure, it cannot affect the sharpness of the picture. But, when an instantaneous shutter with simply an end jar is used for making time exposures, a jar usually occurs the instant the shutter is checked at full opening.

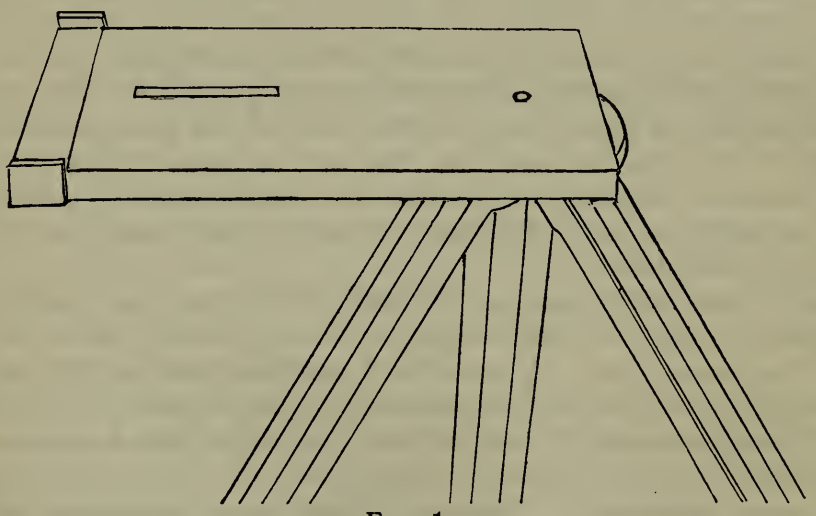


Fig. 1.

This objectionable jar and a jar occurring at any time during an exposure made with an inferior shutter are only in part an intrinsic fault of the shutter. In many cases the greater fault is elsewhere; and it is the purpose of this paper to show where this greater fault is and to describe a means by which the writer largely or wholly overcomes this fault.

A few experiments showed that much of the vibration caused by using a shutter under ordinary conditions had for its centre of movement a line passing vertically through the centre of the tripod top, the movement being a horizontal tremor around this line. The movement was greater as the shutter, on lenses of longer focus, was farther from the centre of the tripod top. It was reasonable to believe this horizontal tremor would largely cease if the shutter were worked approximately over the centre of the tripod top. Further experimenting proved this to be true. By thus preventing horizontal tremor, the jar became scarcely detectable and could be practically neglected in the first-class shutter with which the experimenting was done.

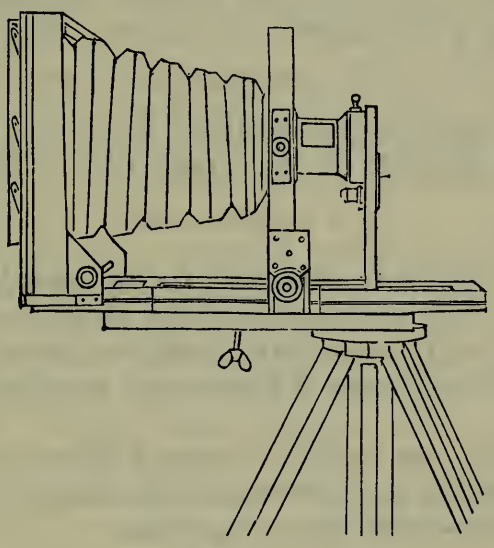


FIG. 2.

In practice the shutter is now centred by means of a board fastened near one end to the tripod with the usual screw (Fig. 1). On the board the camera rests and slides backwards and forwards. Towards the back end of the board is a slot through which passes a screw from below upwards into the camera bed. When this screw is loose the camera slides; when tight the camera is fixed. A cleat at each back corner of the board prevents lateral movement of the camera when it slides. The object to be photographed is first roughly focused; then the camera is slid and fixed with the shutter over the centre of the tripod top (Fig. 2); and lastly, critical focusing is done.

A. Clifford Mercer.

DETECTIVE CAMERA FOCUSING.

To most "snap-shot" cameras, furnished with lenses of over three inches focal length, there is attached a *scale of distances* —generally from 100 feet down—so arranged that when an indicator of some sort is set to any particular number, all objects that number of feet away will be in sharp focus upon the sensitive surface.

The principle on which this scale should be constructed was discussed and illustrated by the present writer in THE AMERICAN ANNUAL OF PHOTOGRAPHY for 1888. It was there proven that *the equivalent focus of any lens* (f) *is a mean proportional between the distance of any object* (D) *and the amount of increase of space* (d) *between lens and ground-glass necessary to bring that object into focus.* That is to say:

$$D : f :: f : d; \text{ and therefore } d = f^2/D.$$

If, for example, the equivalent focus of a lens (f) is 6 inches, and the distance of the object (D) is 30 feet,

$$d = 36/260 = 1/10;$$

Therefore this six-inch principal focus must be increased by one-tenth of an inch to bring an object 30 feet away into sharp focus. An object 15 feet away would require an increment of one-fifth of an inch; one 6 feet away, one-half an inch; and so on.

It occurred to me early this snowy afternoon—for here in the upper Engadine it is snowing hard to-day, if it *is* only the 8th of September—that this proportion

$$D : f :: f : d$$

might be useful in another very practical way: *i.e.*, to determine, with any given diaphragm opening, the distance of the nearest object to a lens beyond which all other objects will be in approximately good focus.

I reasoned thus: If I focus my lens on any convenient object, and then with successive "stops," from $f/8$ down to $f/60$, determine by experiment how far I can move the ground-glass in and out without sensibly disturbing the sharpness of the image, I shall obtain a value for d in each case, from which D (the distance of the nearest object) may be easily found.

Of course it is well known that a small diaphragm opening gives a greater depth of focus than a large one; hence the

value of d will become larger and larger as the aperture grows smaller and smaller.

It is also well known (as proved by the distinguished optician, the late J. H. Dallmeyer, in his "Choice and Use of Photographic Lenses") that unless the "circles of confusion" resulting from inexact focusing exceed the one-hundredth part of an inch, they cannot be detected by the average unassisted eye; hence with any diaphragm aperture there is always *some* allowable play between lens and plate without materially altering the focus.

I at once made a practical experiment. With the three lenses which I happen to have with me here—all of the same make, with "stops" of the same intensity ratio—of four inches, six inches, and seven inches respectively, I found that I had practically *the same range of movement* with a given "stop"; and that this range was as follows: With $f/8$, one-fifteenth of an inch; with $f/10$, one-twelfth of an inch; with $f/15$, one-eighth of an inch; with $f/22.5$, one-fifth of an inch; with $f/30$, one-fourth of an inch; with $f/45$, one-third of an inch; and with $f/60$, one half an inch.

These, then, are the successive values of d, from which to obtain D in each instance and with each lens. From our proportion above we have $D = f^2/d$.

With the lens, therefore, of 4 inches focus, using $f/8$ intensity ratio, $D = 16 \div 1/15$, = 240 inches, = 20 feet; using $f/10$, $D = 16 \div 1/12$, = 192 inches, = 16 feet; using $f/15$, $D = 16 \div 1/8$, = 128 inches, = 10.66 feet; using $f/22.5$, $D = 16 \div 1/5$, = 80 inches, = 6.66 feet; using $f/30$, $D = 16 \div 1/4$, = 64 inches, = 5.33 feet; using $f/45$, $D = 16 \div 1/3$, = 48 inches, = 4 feet; and using $f/60$, $D = 16 \div 1/2$, = 32 inches, = 2.66 feet. Hence this lens with an $f/8$ diaphragm, when focused on an object 20 feet away, will be also in focus for all objects *beyond* 20 feet; with an $f/15$ diaphragm it will be in focus for everything beyond *11* feet; and so on.

The 6-inch focus lens, under the same conditions, gives with $f/8$, D = 45 feet; with $f/15$, 24 feet; with $f/45$, 9 feet, etc. —(f^2 being now 36).

Similarly the 7-inch lens—($f^2 = 49$)—makes, in these three instances, D equal to 63 feet, 33 feet, and 12 feet, respectively.

From all this we derive the following rule for finding the distance of the nearest object beyond which everything else will be in focus:

Divide the square of the focal length of the lens in inches by that fraction of an inch which represents the greatest per-

missible in-and-out movement of the focusing screen with any given diaphragm.

In other words, multiply the square of the focal length of the lens by the following constants, according to the diaphragm employed:

$\frac{f}{8}$	$\frac{f}{10}$	$\frac{f}{15}$	$\frac{f}{22.5}$	$\frac{f}{30}$	$\frac{f}{45}$	$\frac{f}{60}$
15	12	8	5	4	3	2

As few detective cameras have lenses exceeding six inches equivalent focus, and as an aperture larger than *f*/10 is rarely necessary for instantaneous work, it is evident that the amateur need not bother about the numbers on his focusing-scale beyond 35 or 40 feet. In point of fact, nine-tenths of the snap shots taken with ordinary cameras will be at their very best focus when the index points at about 40 on the scale.

After collecting all these *data* and examining them a little, I discovered that results almost identical with those arrived at above are obtained by dividing the intensity ratio of the diaphragm opening by ten, and then dividing the square of the focal length of the lens in inches by *that*. The quotient will be the distance of the nearest object in *feet*.

Exempli gratia—referring to our former examples—with the 4-inch lens, *f*/8 aperture gives 16 ÷ 0.8, = 20 feet; *f*/15 aperture gives 16 ÷ 1.5, = 10.66 feet; *f*/45 aperture gives 16 ÷ 4.5, = 3.55 feet, etc. With the 6-inch lens, *f*/8 makes 36 ÷ 0.8, = 45 feet; *f*/15 makes 36 ÷ 1.5, = 24 feet; *f*/45 makes 36 ÷ 4.5, = 8 feet, etc. With the 7-inch lens the results are: with *f*/8, 49 ÷ 0.8, = 61.25 feet; with *f*/15 49 ÷ 15, = 32.66 feet; with *f*/45, 49 ÷ 4.5, = 10.88 feet; etc., etc.

Hence the simplest and most easily remembered rule of all is this: *To find the distance of the nearest object beyond which everything is in focus, divide the square of the focal length of the lens by one-tenth of the intensity ratio of its aperture.*

Clarence C. Woodman, Ph.D.

PHOTOGRAPHIC WIT.

High Art.

"As a means of expression photography is getting to be a wonderful art."

"Yes, every time I see Sponger's photograph I can hear him asking for the loan of a five dollar bill!"

Incomplete.

"I'll not take those photographs."

"Why not?"

"I spent a month ornamenting the front of my dress in a certain way and your photographs don't show the quality of the buttons or the trimmings in the least!"

Well Taken Care Of.

"Have you ever had your photograph taken?"

"I have, and it isn't every one's picture that is so carefully guarded and treasured."

And he omitted to add that he was Number 1,017 in the Rogues' Gallery.

Nathan M. Levy.

SLOW VS. RAPID DEVELOPMENT.

In one of the later numbers of this Annual is a formula for compounding a hydroquinone developer, which is recommended for instantaneous exposures; also one for normal exposures. One of the virtues ascribed to these developers is "rapidity of action."

The writer has tried them and his experience was satisfactory only after modifying the developers in order to retard their action. In 90 per cent. of the cases in which negatives were completed by rapid development, they were of distinctly inferior quality. Chemical fog, insufficient contrast (or else exaggerated contrast), unsatisfactory half-tones, etc., were some of the defects noticeable.

It is said of hydroquinone that it will not produce chemical fog. Is there any developer which will not do so if it is compounded so as to attain the maximum of rapid action and is applied to exposed plates in which the shadows are under-exposed, or where there are other certain effects of light which seem to have exerted an obscure influence on the sensitive film? The writer believes not.

There is probably not a photographic editor in this, or other countries, who advises the habitual development of plates with "rapid" developers. Is there a "professional" in the world who regularly uses them? Are there amateurs who do so? And will their negatives stand any comparison with those developed with "normal" solutions? I think not. The silver molecules won't be "bulldozed."

W. H. Gardner.

DO NOT TRIFLE WITH THE ART OF PHOTOGRAPHY

Let me begin by asking: What is the principal aim of the photographer? Is it not to make attractive and agreeable pictures? Assuredly in most instances we think it is. Then how shall we go about doing so? I think by adhering, as far as possible, to a few leading principles, and will endeavor to give them as briefly as possible.

At the outset, the aspirant with the camera should ask himself when about to make a picture, whether the subject before him is worthy of the effort. Does it come under the head of the beautiful or the picturesque, or is it steeped in the commonplace? and whether there is any approach to grouping or effect.

It will be said by many, by the majority probably, "What matters it about grouping and effect—when we see a scene as it exists and make a picture of it, is it not true to nature, and what more do we want than such truth?" But I will ask such as hold this view, what they do when they wish to have their portrait taken. Do they not go to a photographer, and placing themselves in his hands, avail themselves of his carefully arranged lighting and of his knowledge in posing—and why? Simply because they wish not only to be portrayed under the most favorable conditions, so that they may look their best, but they also feel proud if on showing the work it is pronounced a picture, something that does credit, not only to themselves but to the artist who produced it. Now in our efforts with the camera, why should we not accord the same benefit to whatever we may portray, whether it be man or beast, or landscape? Why should we not give them the benefit of all we know of composition and lighting? If we concede this we will at once set about applying the principles which we see in good works of art and in agreeable effects in nature, and we will find: That a diffused lighting, except in subjects which have great projection or other accidental conditions

favoring it, can only make a weak, flat picture. In portraiture the principal light used is a direct one, the others being merely softeners, in a slight degree, of the asperities. In groupings and landscape and architectural subjects, it is the direct lighting of the sun which gives power and brilliancy to our work. Let us, therefore, get a good, vigorous lighting from the most favorable direction and we will be safe upon that point.

That too many objects scattered about promiscuously will always make a distracting and unsatisfactory picture. There should be grouping, so that the attention may concentrate upon the principal features, and find repose throughout the rest of the work.

That when we drop mere portraiture and come into the nicer considerations of composition, there should be an agreeable flow of lines, angularity and parallelism must be avoided, as well as too much similarity of lines, or repetition. Repetition begets weakness, insipidity. Contrast gives vivacity and is agreeable.

That there should be a predominance of half-tones; half lights to support the lights, and half shadows to support the shadows. This quality, in photography, is dependent largely upon careful exposure and development. It is a very important one. A picture composed solely of high light and deep shadow will always be hard. The most agreeable picture will be the one in which there is but a comparatively small amount of brilliant light, and intense shadow, and the main portion made up of supporting half-tones. If the highest light and deepest shadow are situated or placed close together, the work will have most force and brilliancy; if apart, most breadth of effect.

Referring again to composition, it is by far the most difficult quality to deal with in photography. Our subjects are so little under our control, and especially do we encounter difficulty by the interference of extraneous objects which are entirely out of the pale of the intended subject. In outdoor subjects if we could control our backgrounds to any extent how many more agreeable pictures we would have than we do. Go where we will, in attempting outdoor subjects, unless it be open landscape views, we are beset with brilliantly illuminated scattering and generally commonplace objects, which either detract from or utterly destroy the effective impression of our principal groups. It should be the constant effort of the photographer to avoid the defect of busy backgrounds in his work. In many instances dust, haze, atmosphere, call it what

you will, will, by subduing and giving aerial perspective, greatly enhance the attractive effect of your picture.

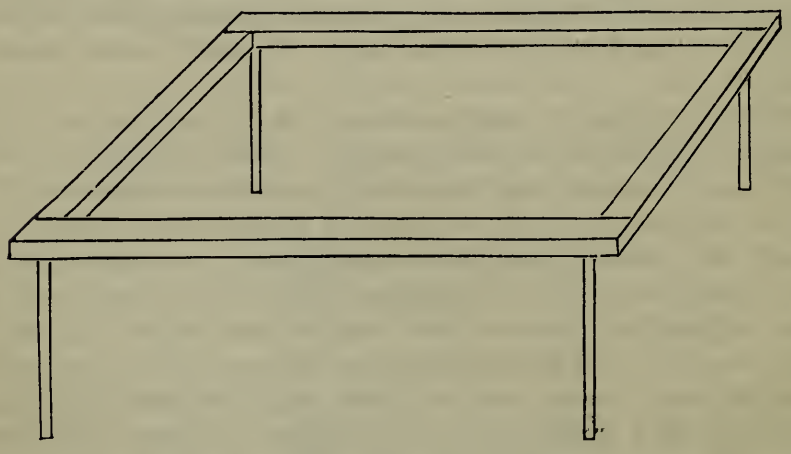
To close, let me again urge the avoiding of trivial subjects. The majority of painters now devote too much attention to trivial subjects. They exhibit as pictures, works, the subjects of which were not worthy to have made mere sketches of. Let the public set their faces against such trifling, and the photographer assist by choosing that which, either in point of story, or in the qualities of a picture, make it worthy of portrayal. Let there be meaning, mind, elevation in your work.

Xanthus Smith.

PHOTOGRAPHING SURGICAL SPECIMENS.

Being engaged in photographing specimens from the gynæcological operating room of the Johns Hopkins Hospital, and experiencing some trouble in properly holding and lighting them, I devised a manner of so doing which facilitates the work, and makes the resulting photograph a very striking representation of the original, showing adhesions, etc., in a manner which cannot be otherwise obtained.

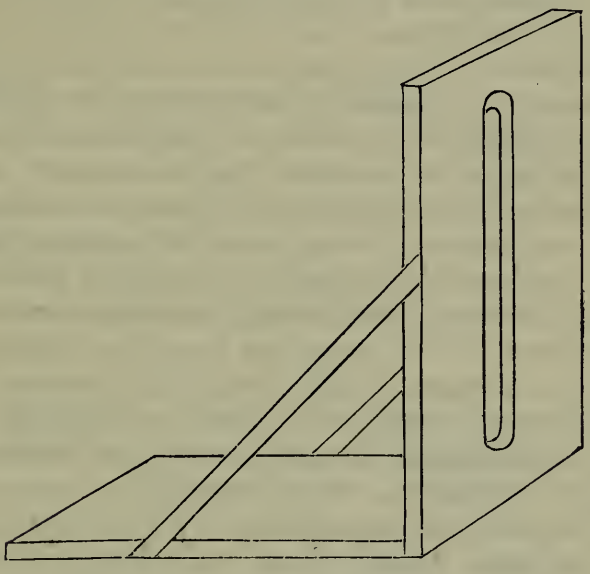
I had a small light frame constructed, supported by very slender legs, so as the whole would not obstruct much light, and throw shadows across the background; this had an appearance of the following sketch:



The frame was 18 inches square, and made of $\frac{3}{4}$-inch square material, and supported by legs $\frac{1}{2}$ inch round and 14 inches high. On this frame I placed a shallow glass dish which was

filled with water, into which the specimens were placed. I had also made an angle or support for the camera, as here indicated by the following sketch, which was clamped on the top of a table, so as the tripod screw would slide in the vertical slot and secure the camera in a position pointing into the dish.

It is best to have that part of the above to which the camera is fastened about 24 inches high so as to give considerable movement to the same, the other need not be more than 12 inches long. Under the dish and frame I place a cardboard on which is pasted a piece of the material and of the same color



as that used in the photographic galleries, viz., of a soft gray color.

The whole apparatus was placed at such a distance from a large side-window that the rays of light fell into the dish and also under, lighting up the background under it. The adhesions, etc., on the specimens floated out into the surrounding water, and gave an effect which was very striking, and could not well be improved upon.

Flowers may be with fine effect taken in this manner, only substituting for the dish a sheet of plate-glass, with the same laid thereon. I have also made copies of drawings in book-form, in this manner, as the book would lay flat and receive a nice even illumination.

A. S. Murray.

THE EDUCATIONAL VALUE OF THE CAMERA.

This paper might have been entitled "On the Value of Photography as a Means of Education." But, somehow, to the ordinary photographer this would seem a very inclusive title. It would bring in a discussion of the value of beautiful views, or of reproductions, illustrative of innumerable artistic or useful things in the arts and sciences. But that is not what we mean when we talk of the "educational value of *the camera*." Nor yet need we expatiate upon the work of specialists who go to nature with the camera to get more definite results than they otherwise could from the microscope, or to obtain on the sensitive film images of things their eyes could not distinguish through their telescopes.

Let us consider an everyday man who has just bought an everyday camera. Probably he had never before thought very seriously about what went to form those beautiful effects that appealed to him so in nature, and hence in art. Color values, light and shade effects, balance of lines and masses, had been, in his ear, art terms; things more of sound than of vivid meaning. To have *knowledge of* anything from theory is a very different matter from having *knowledge about* that thing from experience. The everyday man has not had time to learn of these things as the artist has learned. Here the camera will step in and teach him, by inducing observation and critical examination, though he regard his camera merely as a means of recreation. It will teach him nearly as much by its limitations as by its capabilities. When he is carried away by a view exquisite mainly from its coloring, photographs it, and obtains a flat, uninteresting print, he will begin to analyze. He will begin to separate beauty into some of its component parts. Beauty of color he will appreciate and long for, because he can not fix it on his plate. Beauty of form, and of light and shade, he will seek with eager eyes, because these he can photograph.

The man will take carefully the photograph of a beautiful vista, or of a group of lovely maidens and stalwart lads—and find the one appears out of proportion, the other inharmonious. He had not chosen well the foreground of the view, or perhaps had not put the camera at the proper height. He had not posed his group artistically, so the result was angular or lop-sided. In other words, he has received his first lessons in composition; no books could give them as well.

The everyday man goes for an outing with his new camera.

He climbs an eminence and looks far away over hill and dale into the blue distance. He takes a few such distant views, develops them and becomes a wiser, if sadder, man. Distances have always impressed the everyday man; they are the unusual. The everyday things that lie around him are so usual that he has grown accustomed to overlooking them. He has done so since he was a child, for he thinks he knows all about them, when really he only knows *of* them.

He wishes his camera to overlook these common things, too, but his camera will not do so. The nearer, the better for it; it seems to believe implicitly in the beauty of common things.

So it comes about that his camera teaches the everyday man to look with his eyes seeingly at everyday things. And then the everyday things grow new and wonderful to him. What were stones, grass and weeds before, things to be trodden down or thrown aside, are now miniature worlds of beauty.

Not that the everyday man now disregards distances. Rather these become bluer, farther and grander with the added beauty of every small plant, stone and tree that adds its little to form the beautiful whole.

How if all this is true of a grown-up person how much more is it bound to be true, and how much the more valuable for being true, of growing boys and girls.

The necessity, even, of a "good, general education" is universally admitted nowadays. But how do people go about giving this education to their sons and daughters? In training their minds, they go to great care to develop their rational faculties, and they store their memories with facts and opinions for the reason to go upon. Their moral natures they try to educate also, though less scientifically, it is true, and by more antique, empirical methods. The parents also train their children's hands and minds to some trade or profession. But should the doing of these things well be the full ideal of a good, general education? Evidently a perfect man would have to be such in soul, mind and body. A failure in any one of these requisites would not only make him approach less nearly the ideal because failing in that one particular, but because it makes him less perfect in the others also. None could have a perfect mind without a perfect body, any more than an engine with an insufficient capacity for the generation of steam could reach the power for which its gearing had been planned and built.

Now in our system of education there is little or no attention paid to education of the body. It is left more or less to *grow*

up as best it may. Nor is the proper education of the ear and eye generally attended to. This was not always so, nor is it necessary. It has come about because our scheme of education is the outgrowth of the one-sided, ascetic system of the dark Middle Ages, when the body was maltreated, and æsthetic education neglected. The Greeks knew better than this and recognized that truth which Keats, that modern Greek, has voiced for us: "Beauty is Truth, Truth Beauty." The Greeks were educated to see, know and feel beauty as well as truth. We are trained to distinguish truth only. Too often we cannot see the beauty; and sometimes we cannot fully grasp a truth just because we cannot realize its beauty.

Surely then we should do everything we can to remedy this defect in modern education.

It is true that the result might not always, and necessarily, show an increased capacity for the gaining of dollars and cents. But there are other things in life than dollars and cents. One is at least as rich from having gained a new capacity for enjoyment, an added appreciation of beauty, as he would become by the addition of some hundreds or even thousands of dollars to his income. There is as much difference between the educated "hearing" or "seeing" and the uneducated, as between the trained and untrained reason or taste for poetry.

It would certainly seem worth while then, to train the "seeing" capacity of our boys and girls, even if this had to be done by adding tasks to the usual studies. But much, very much, can be done without this. If photography is begun young, what may not be learned in "play"? If the boys and girls are encouraged and aided in this fascinating and innocent form of amusement and the results obtained criticized, can the outcome be other than beneficial?

From the awakened interest, it is easy to guide on to a study of botany or geology; from the simplest demonstrations of art principles can come the study of Burnet and Ruskin.

Life cannot but be sweeter, fuller and better for those thus educated; and all this could be obtained by an outlay ridiculously small when compared with its results.

Of course not every boy or girl would become an artist, nor all become even artistic in tastes. There are even some who would always as soon "take" the square, six-window-to a-side family mansion as a moss-grown cottage or ruined mill; who would prefer a sharply focused photograph of the hired girl, in her Sunday rig, to a soft-toned picture of the "Raggedy Man." But these are the exceptions which prove the rule.

There are few girls and boys who would not be the better, mind and body, for having a camera; who would not gain in their appreciation and understanding of Nature and Art—and that is what we need of education.

Dallett Fuguet.

REMOVING VARNISH FROM NEGATIVES.

Although the dry-plate of the present day is usually of such quality that no difficulty need arise in obtaining the necessary amount of density, it is yet the fact that among amateurs and professionals alike, a considerable number of negatives are in daily use which would be all the better for a little extra density, and sometimes, indeed, reduction.

If any one suggests, when such negatives are under discussion, that intensifying, etc., might be resorted to with advantage, it is not uncommon to hear as reply, "Oh the plate is varnished, and it is such a nuisance to take the varnish off, and when removed ten chances to one it will stain."

It will be admitted that this style of suggestion and reply is no suppositious case, and a negative I recently saw in a professional friend's hands was so illustrative of this unnecessary difficulty that a few hints upon varnish removing may not be without value for some readers of this Annual.

It may be stated at the outset that when a negative after removal of the varnish is to be subjected to the action of intensifier or reducer, the result will be a disastrous failure unless the coating of varnish be entirely removed, and not a trace left upon the surface of the film. If this truth be thoroughly understood all difficulty should cease; for it is not a difficult matter to act upon it. The usual causes of failure are two: first, over-hastiness in conducting the operations; second, the use of an insufficient quantity of spirit.

Perhaps the simplest plan of procedure is to place the negative in just such a tray as is used for developing, cover it over, at least quarter of an inch deep, with alcohol, protect from evaporation by placing a large sheet of glass over all, and, keeping the whole in a fairly warm place, rock the dish at intervals. After a day's soaking in this manner most of the varnish will be removed; the negative must then be transferred to another dish with clean spirit, and a few hours' more soaking given. But what must not be done at this stage is, either to place in the drying rack, or to finish washing under the tap.

In the former case an excessively minute film of varnish may be left behind from the spirit that dries upon the plate; in the latter the resin of the varnish will be precipitated, also in minute quantity, upon the surface of the negative. In either case subsequent chemical operations would be interfered with, and a clouded negative of irregular density be the result, and an incurable result.

What should be done is, either to flow successive fresh portions of clean spirit over the surface, so as to wash away every trace of varnish, or, what is still better and more economical, add to the second spirit bath about 5 per cent. of its volume of strong ammonia solution. The peculiar property of this chemical, discovered and published some years ago, is to render spirituous solutions of shellac entirely mixable with water, and in any proportion, without precipitation or cloudiness being produced. The basis of most varnishes is shellac, any other resin will be present in such small quantities that it can be ignored.

After soaking in this ammoniated alcohol, the plate can be washed in the usual way when it will be found absolutely free from varnish and can be treated just as an ordinary unvarnished plate.

G. Watmough Webster.

DEVELOPERS FOR HAND-CAMERA NEGATIVES.

I AM often asked how I develop my fast hand-camera negatives—that is, exposures of from $\frac{1}{60}$ to $\frac{1}{300}$ of a second, and so give the developers I use in case any brother amateur wishes to try them.

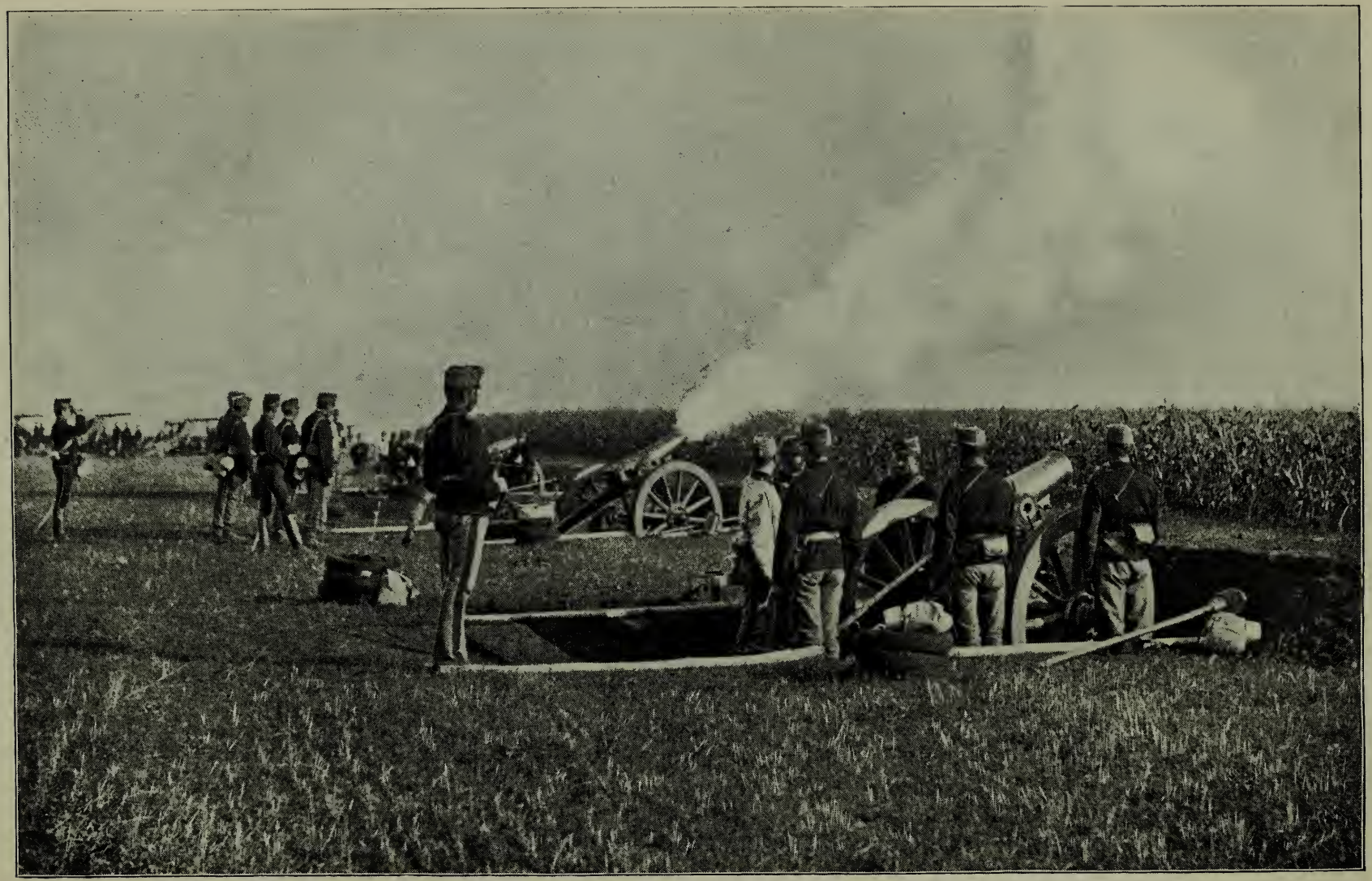
The one I use, as a rule, for my quickest exposures and the one that works best with me is the eikonogen formula, which I mix as follows:

Eikonogen	1	ounce
Sulphite soda	4	ounces
Carbonate potash	1	ounce
Carbonate soda	1½	ounces

Boil and make up to 30 ounces of water.

I use it full strength and keep on hand a saturated solution of carbonate potash, and if, after developing for some time, I find I cannot get out detail enough, I add half a drachm of saturated solution potash to each ounce of developer used.

It is well to keep some hydroquinone developer at hand (any formula) in case one cannot get density enough, as, after



Lieut. Carl Hiller, Photo.

Wm. Kurtz, Engraver.

ARTILLERY PRACTICE.

all detail is got, one can get any density by applying the hydroquinone developer. I use, as a rule, Eastman films, and find the eikonogen formula given all that could be wished, and have numbers of negatives that had the $\frac{1}{250}$ of a second exposure to be fully exposed when using said developer, and get density without wanting any hydroquinone.

With Edwards' isochromatic plates I also get any amount of density without using the quinone developer, but, as a rule, have to use it with other makes of plates.

I can strongly recommend this developer, and if you cannot get all you require with this formula, no other will give it.

The next best developer in my hands for developing negatives that have had a very fast exposure is rodinal and quinone. For use I mix: Rodinal, 1 part, to water, 20 parts, and proceed to develop with the full strength, and have also some quinone developer mixed ready for use. I first pour on the rodinal developer, and the image will appear at once. Keep on the rodinal till all detail is out, and then pour on the quinone till density is got. I find rodinal will not give density enough without quinone.

Of course, for negatives that have had more exposure you dilute the developers with water; and if negatives have been over-exposed, you must dilute a lot and add bromide.

The formula for eikonogen given is a very good developer (*full strength*) for bromide papers, and is the one I always use.

A. R. Dresser.

HOME-MADE WASHING PANS.

Being something of a tramp, I find it necessary to have light baggage; for those who are placed the same, my home-made washing pans for prints might be a good idea. In my many stops I get some light wood boxes at the grocer's about two feet long, fourteen inches wide, four deep; then with black preble enamel cloth from the dry goods shop line them, turning the corners in, *not cut*, and tacking slightly over the edges. My hyposulphite box is made the same, so when one makes a move the boxes can be thrown away, enamel cloth rolled up and taken in one's trunk, ready for the next scene of action. For a silver pan to coat the paper in, I get some light, thin wood, cutting a piece for the bottom a little larger than paper to be silvered, either half or quarter sheet, slanting out the corners after putting together the pieces making the pan

about three inches deep, line by pasting on some smooth black enamel cloth, folding in the corner, paste cloth over the edge so when silvering, paper can be drawn over the edge instead of a rod, one has a pan that will last several years at the cost of 50 cents or less.

Miss Lucy B. Salter.

CLOUD EFFECTS.

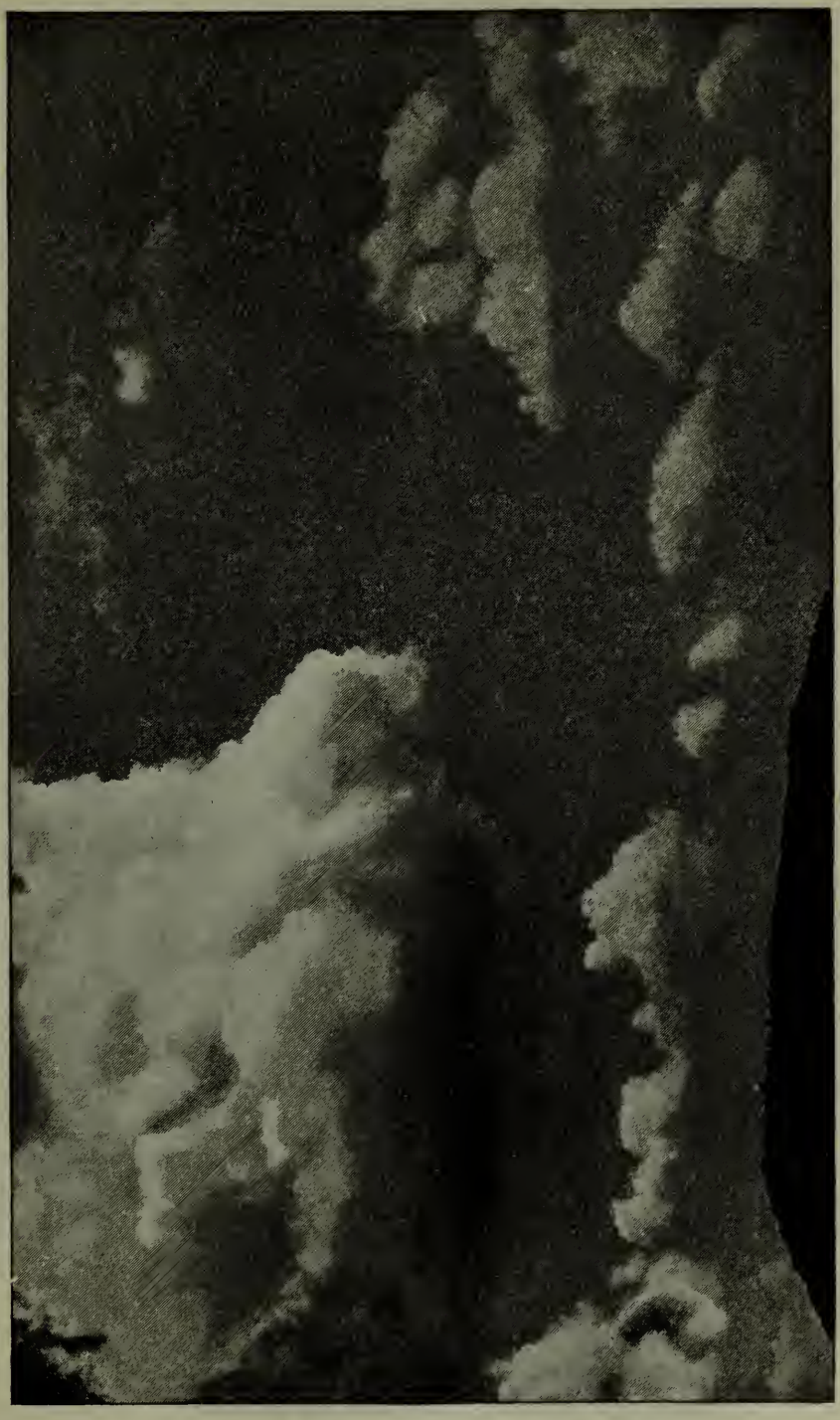
I was much interested in reading Canfyn's "How to Obtain Clouds in a Landscape," and studied much his "Blankenbergh Beach." This prompted me to tell the readers of The Photo Times Annual my way of getting clouds (or water) which is very similar to Canfyn's but more convenient. I use an ordinary all wooden drop shutter. I place two (2) elastics around the shutter frame—one near the top—the other just above the lens; between these and shutter frame I place a (C. D. V.) card or any card wide enough to cover opening in shutter when pushed down over it.

Now put your head under the focusing cloth, then reach out and push card downward; as it passes over the opening a shadow will creep up over the ground-glass from the bottom, of course; continue to slide card downward till the shadow *a little more* than covers the sky or water on the ground-glass; then, having first focused, make the exposure and you have "reached your destination"—not to use slang.

These cards can be cut to conform to any shape of sky. If the sky drops down in centre—oval in form—simply cut lower end of card oval in form; if the sky cuts across one corner of plate, cut corresponding corner of card and so on. We have here at one point the Kansas River widening out in the foreground; then stretching across the entire centre of plate is a narrow belt of timber and above this is sky; three-fourths of the scene is sky and water; in this case I place another card on *lower* end of shutter, in similar manner to the one above, and push this one *up* and the upper card *down* till sky and water are covered with the shadow on ground-glass, shutting off the strong light from both, leaving only the strip of timber nearly fully illuminated.

In fact, you can so manipulate these cards as to meet every case in hand and produce a happy, peaceful smile when your plate leaves the fixing bath.

J. M. Lingfelter.



CLOUD EFFECTS.

A USEFUL DODGE FOR ARISTOTYPE PRINTERS.

Users of aristotype paper very often are annoyed in their printing by having some of the paper stick to the negative. If not successfully removed an entire negative may thus be ruined. I have hit upon a dodge which removes the difficulty completely without injuring the negative in the slightest.

Immerse the negative which has thus been marred in a hypo solution, and leave it there until the brown spots or streaks caused by the paper have entirely disappeared. Then remove the negative from the hypo bath and wash thoroughly by laying the negative in clean water, changing the water frequently. Do not allow the water to run on the negative as it would remove the retouching.

When the hypo has been removed from the plate by washing remove the negative from the water bath and set it up to dry in the usual manner. If the process is accomplished with care the negative will dry as perfectly as if nothing had happened and the retouching even will not be marred.

J. H. Reuvers.

PACKING LANTERN-SLIDES.

One of the problems of the American Lantern-Slide Interchange was to provide a safe vehicle for holding lantern-slides during transportation and the consequent rough handling by the express companies. Besides this, the box should be compact, quickly accessible, and conveniently arranged for the easy handling of the set for exhibition purposes.

In the United States, as a result of some four or five years' experience, two plans, both based upon the separation of slides, have been adopted. The first consists in ordinary grooved wood boxes, lined with felting at the bottom and on the under side of the cover, so that when shut the slides are clamped between the two strips of felt and are separated by the wood tongues. A box holding fifty slides will measure nearly fourteen inches long. If the wood tongues are thin and a thick slide is inserted it will sometimes crack the wood, and a subsequent jar endwise will break off the tongue entirely. When this occurs the loose slide, in striking with some concussion against its neighbors, will perhaps cause them to break other wood tongues. I have seen half a dozen of them broken off at one time, causing damage to the glass slides.

About two years ago it occurred to me that it would be possible to get up a rubber grooved strip which would have yielding flexible tongues, be more compact, durable, and work as well as the raised rubber mats of commerce.

I had a special mould made and had rubber strips cast therefrom. These have more than fulfilled my expectations and are now regularly used on many of the Lantern-Slide Interchange boxes. Each box, usually made of hard wood, and holding four strips, measures about a foot square and carries one hundred slides. The strip is easily glued on to the inner sides of the box, and when once in forms a neat looking compartment. The divisions or tongues yield readily to thick slides, and, as the latter project above the top of the lower half of the box about half an inch, they are easily got at for exhibition purposes. The slides thus packed are completely surrounded by soft, yielding material and cannot get damaged from the heaviest jar. The slide-box is put into an outer box lined with saddle-felting, and it is ready for shipment. The lid of this box is secured by screws, and it is preferable to use machine screws, which enter bolt-plates set into edges of the box, as ordinary screws, working repeatedly in the wood by frequent removals of the cover, fail to hold it securely.

In place of putting felt lengthwise at the bottom of the slide compartment, I have seen a thin rubber tube laid lengthwise in each bottom corner; this acts very well as a cushion, but is probably more expensive than felting.

The second plan, which is perhaps less expensive than the rubber strip, is what may be termed the cellular method of construction, and is one particularly perfected by the California Camera Club; it is also very compact, possibly too compact for easy handling. In place of grooves placed along each inner side of the slide compartment, slits are sawed transversely to the length in each side, a trifle over one eighth of an inch apart, and a sheet of cardboard about one-sixteenth of an inch thick is pushed down, forming a square sheet somewhat shorter than the slide. The cardboard may be secured by a drop or two of glue. Every other sheet of cardboard is about one-quarter of an inch longer than the other, which enables slides to be put into the cells much easier than if all were of uniform height. Before the card divisions are inserted the bottom of the compartment is lined with felting.

It will be seen that a box thus constructed will consist of numerous cells, each holding a slide, which, being separated by the cardboard sheet, is protected from injury. A special hook

hinge is provided by which the cover of the box may be separated from the box when it is desired to examine the slides or to use them at an exhibition.

These two plans are those mostly recommended, and make it safe to ship lantern-slides all over the world.

In sending slides without special boxes it is advisable to tie them up in packages of six in a package, and place plenty of soft paper around them.

For storage in the house the special cardboard telescopic boxes are about the best, as the slides are kept compact, free from dust, and are easily handled.

F. C. Beach.

SULPHUR OR GOLD, WHICH?

It is high time that photographers of all classes and grades, professionals and amateurs, those doing much and those doing little, veterans and new recruits, should unite, as in a common cause, in an honest effort to overcome in the minds of the people the prevailing unfavorable opinion regarding the stability of our productions.

We owe it to ourselves and to our art that we furnish to our patrons in return for the price which they pay, the best and most durable work, of the kind bargained for, that we are able to make. If they afterwards find, for reasons of their own, that it is not worth keeping, they have the right to destroy it; but we have no right to anticipate such an outcome by delivering them prints liable, through our neglect, to fade prematurely.

Our implied contract with our patrons is, that we will observe all suitable precautions against such a sequence, and this last implies that our neglecting to do so shall not be in consequence of inexcusable ignorance on our part as to what are suitable precautions.

I am now dealing only with business equities between ourselves and the public. For the present we are not artists but simply artisans, worthy (or ought to be) of being employed by common people, and these as a rule do not value their photographs more highly for becoming spotted or fading. They prefer to keep them and let their children have them to keep after them.

Certain artists divert *themselves* by saying smart things about photographs, such as "Their highest praise is that they will shortly fade," and this, "Their permanence is their deep

damnation." To which I beg leave to say, Let them be permanent then, Mr. Whistler, and take the consequences. How shall this desirable end be gained?

Some will say, "The photographs are safe; there is no danger of their being made permanent, or, of the consequences." Well, let them be made as permanent as possible, and I will answer for the people, that they will be quite content.

I have written on this subject before. But there is always something new coming up in connection therewith, and I feel called upon to write again. The latest thing which seems to deserve special attention is the restoration of the ancient heresy of sulphur toning to a place in the creed of the faithful, wherein it fits with the same propriety as Satan might occupy a pulpit. There are already quite a number of mixtures published, which will cause sulphuration in the silver print. I know of several not included in the imported list, one of which is admirable in its working qualities. All that has to be done in using it, is to immerse the prints just as they come from the printing frame without stopping to trim or wash them, leave them in it until they assume the color preferred, and then remove them to the washing water. Nothing simpler in operation was ever devised. With it a boy ten years old could do the toning of a large establishment. This bath was a discovery of my own, and as it differed in construction from any other, I hoped it might prove useful in practice. But before recommending it to photographers and before using it myself for ordinary work, I tested the prints thoroughly by the side of those toned with gold and found them unreliable in comparison. I was very loth to be convinced of their unreliableness, got chemists to examine them, distributed samples among some of my friends, hoping they would find them to be as I hoped. The result was disappointing. After putting them to trial and watching them a sufficient time I was compelled to admit that they were decidedly inferior to those toned with gold.

Still it is a fact that I have some of those prints made twenty years ago; some of the very same that I showed in St. Louis at the Convention of the N. P. A. in '72, that are as good now as they were then, and may be, for ought I know to the contrary, twenty years hence. But this evidence, however apparently strong in their favor, is actually worthless. They have been kept dry, away from much light and oxygen; conditions under which they have come off safe—by chance. They have been accidentally saved.

Bring them out from their cosy corner, place them where they will have plenty of air, and sometimes a little dampness, side by side with some good gold-toned proofs properly fixed and washed, and see where they will be in a year or two.

But as you may not care to wait so long, you may take any prints toned exclusively with sulphur, with some of the others as described; and by the way, don't fail to add a few gold-toned prints fixed in an old hypo bath (for if sulphur-toning is right it is also right to use the hypo for fixing as often and as long as you like); wash these different lots in different dishes so that neither will contaminate the other, but serve all alike, alternating with cold and hot water, not very hot at first, until the hypo is well out, then finish by pouring boiling water over them.

Now if they all come out of this short trial equally unharmed I shall be ready to own myself much mistaken, but presume the hot water will redden the gold-toned prints somewhat, an effect which will mostly or wholly disappear on drying; and that the others will turn as yellow under the treatment in an hour as the former ought to become in thirty years. Every one can easily make the experiment to satisfy himself; if it turn out as I predict it will, then it will be safe to conclude that sulphur-toning baths and old hypo solutions are unfit to use.

W. H. Sherman.

A PLEA FOR ACCURACY AND PRECISION.

Once upon a time the curly head of a small boy was made the field of experiment, to test the virtues of a cleansing and invigorating hair-wash strongly recommended by a neighboring matron, who vouched for its excellence and furnished a recipe, fairly written out, wherein the chief ingredients were applejack and gum arabic. That small boy, now grown mature and sedate, recalls to this hour the horrors of the occasion, the hide-bound sensation as the lotion dried upon his scalp, and the statuesque rigidity of his curls, made marble-proof against the toying breeze. The night too brought its memorable tortures, the dawn a copious scrubbing to remove the crackly deposit; and all this because of the slight error of writing "gum arabic" for "borax."

A moral, drawn from this trivial incident, suggests itself in regard to the countless photographic formulas which the amateur is invited to essay. A very ordinary acquaintance

with chemistry and the routine processes of photography may suggest that the recommended formula is not applicable in theory, nor exact in detail or proportion, but the average amateur, especially he who makes it a scrupulous duty to test every new dodge and experiment with each fresh formula that meets his eye, does not always possess the practical knowledge to warn him from danger in this regard; and so he pins his faith to the authoritative advice that comes to him in print with the guarantee of some more or less eminent name, and gravely essays the impossible or the absurd.

I have in mind a strongly recommended process for developing bromide paper, whereof the formula began by ordering 4 ounces of "chlorate" of potash to be dissolved in 12 ounces of water. It can't be done at ordinary temperatures, for the salt is sparingly soluble. If it could be so dissolved, it would be inert in contact with the ferric protosulphate solution directed to be added in developing the print. Of course, "oxalate" of potash was meant, not "chlorate." Another receipt, vouched for by one who knows more of the dark art than I ever dreamed of learning, demanded the solution of 150 grains of "bromide of aluminium" in 3 grains of water! Did anybody ever try that receipt, I wonder, and with what result? I observe, with a dull sensation akin to heart-failure, that about one developer in every ten published invites the unwary and unskilled beginner to preserve his pyro from oxidation by the addition of "sulphate" of soda. Every few weeks I stumble on a blue-print formula requiring me to use "ferro-cyanide" of potassium in compounding it, and my heart goes out to the simple victim of misplaced confidence who hurries to the nearest apothecary's and buys an ounce or two of yellow prussiate of potash, with which to mix a perfectly useless mess. This kind of thing only serves to corrode our tempers and our drain-pipes. The amateur photographer has enough to exasperate him in his own endless capacity for blundering, without being called upon to bear the blunders of others.

And this brings one to another class of trials, born of the Micawber-like bursts of confidence of the chronic experimenter, who, conceiving a bright idea, or evolving a rash theory, straightway writes it out and sends it to the press for somebody else to try. The idea doubtless ought to be good, but unfortunately is not always so. Why cannot the vast Brotherhood of Novelty try their own new-fangled notions thoroughly and prove them successes before giving them to the world?

With an earnest patience in application, care in statement, and precision in every unimportant detail, the truly knowing ones can become in truth sightful guides for the unknowing; and in the end our ashbarrels will not be cluttered with ruined plates, our waste pipes not polluted with chemical failures, and the air of our dark-rooms not quiver with muttered imprecations.

A. A. Adee.

ON STELLAR PHOTOGRAPHY.

Photographers frequently have trouble in the matter of exposures, but the ordinary every-day difficulties are small compared with those which arise in the scientific applications of the art. The story of the international scheme for making a photographic map and star catalogue of the heavens illustrates this in a remarkable manner.

In the original programme of the Paris international committee, adopted in April, 1887, it was laid down that two sets of negatives of the entire heavens should be made with specially constructed star cameras of 13 inches aperture and 135 inches focal distance; namely, one set for the map, showing all stars down to the fourteenth magnitude, and another set for the catalogue, showing stars down to the eleventh magnitude only. Under these limitations, it was estimated that the number of stars on the first set of negatives would be about four millions, and on the second set about twenty-five millions. Thus far the conditions seemed simple enough, the only apparent obstacle being the enormous amount of labor entailed by the comprehensive character of the scheme which contemplated the taking of 44,108 negatives; but as soon as the instruments were ready, and it became necessary to decide exactly how long the negatives of each class should be exposed, unexpected difficulties were encountered.

The committee had adopted Argelander's scale of star magnitudes, and as his classic work stopped at the ninth magnitude it was necessary either to determine visually something like four or five thousand stars for use as standards of the eleventh magnitude, or else to define the exposure time for eleventh magnitude stars in terms of that required for ninth magnitude stars. The latter course was chosen, probably because it involved much less labor than the former, and as Argelander's scale is based upon a light ratio of 2.512—that is, upon the assumption that a star of any given magnitude has 2.512 times

more light than a star of the next smaller magnitude—the international committee decided in September, 1889, that eleventh magnitude stars should have $2.5 \times 2.5 = 6.25$ times more exposure than standard ninth magnitude stars. This implied that the time of exposure for ninth magnitude stars was to be determined experimentally by photographing stars known to be of that magnitude, and that the time so found was to be multiplied by 6.25 in order to obtain the proper exposure for the catalogue plates which were to show all stars down to the eleventh magnitude.

That solution of the difficulty seemed very promising, but after some months of trial it became apparent that the time so determined was not sufficient to register eleventh magnitude stars. Further theoretical discussion ensued, and when the international committee met in April, 1891, another plan was formulated, based upon the use of wire-gauze nettings, having their wires and meshes so proportioned that one of them placed before the objective of a star camera would reduce the light of a ninth magnitude star sufficiently to make it appear as an eleventh magnitude in the camera. The construction of the nettings with sufficient accuracy to cut off precisely the required proportion of light involved a good deal of time and labor, and when finished they proved unsatisfactory, apparently on account of diffraction phenomena set up by the numerous small holes.

Thus the schemes formulated by the international committee in 1889 and 1891 for determining eleventh magnitude stars photographically from the ninth magnitude have both failed, and it remains to be seen what plan will be tried next. Meanwhile, it has become apparent that for stars the photographic light ratio is not the same as the visual light ratio, which is a very puzzling fact because it is contrary to all experience with terrestrial objects. When operating with sun-light doubling the illumination always halves the exposure, and the failure of that rule for star-light probably indicates some hitherto unrecognized peculiarity in the average star spectrum. As stated above, the visual light ratio for stars is 2.512; the photographic light ratio has not yet been accurately determined, but it is approximately 3.27.

The international committee desire that all negatives taken in accordance with their scheme shall be developed in a uniform manner, but the formula to be employed has not yet been designated. In the experimental work carried on by the French observatories, ferrous oxalate seems to be the favorite.

The committee have also decided against the application of any ordinary varnish to the negatives, upon the ground that it is likely to interfere with the accuracy of measurement of the star places.

Notwithstanding the delays in the international scheme, two well-known astronomers, using smaller instruments, and acting upon their own initiative, have already photographed the whole heavens. Professor E. C. Pickering, director of Harvard College Observatory, has secured about thirty thousand negatives, and Dr. David Gill, astronomer royal at the Cape of Good Hope, has photographed the entire southern sky.

Wm. Harkness.

A REMEDY FOR FLASH-LIGHT BURNS.

Every photographer now uses the flash-light in some form and as we are continually getting burnt I have thought this remedy, which I have found to be a very good one in my own experience, might not be out of place here.

Take equal parts of raw linseed oil and lime water, mix and shake well, when it will have the appearance of thick yellow cream; pour this on some absorbent cotton and apply as soon as possible; as it dries more should be poured on.

If the skin has come off it will be better to put a piece of soft linen cloth over the burn first, so as to keep the cotton from sticking to it and irritating the wound.

Keep this on until all the fire is drawn out and it heals; of course change the cotton and bandages as they become soiled or stiff.

After it starts to heal you can substitute vaseline if you choose.

This is one of the best remedies known for a burn, as any one will attest who has tried it.

Great care should be taken with flash-lamps in which the handle screws into the lamp, as in long flashes the lamp becomes so heated as to expand, loosening the handle, when it will turn over onto your hand and give you an occasion to try the above cure.

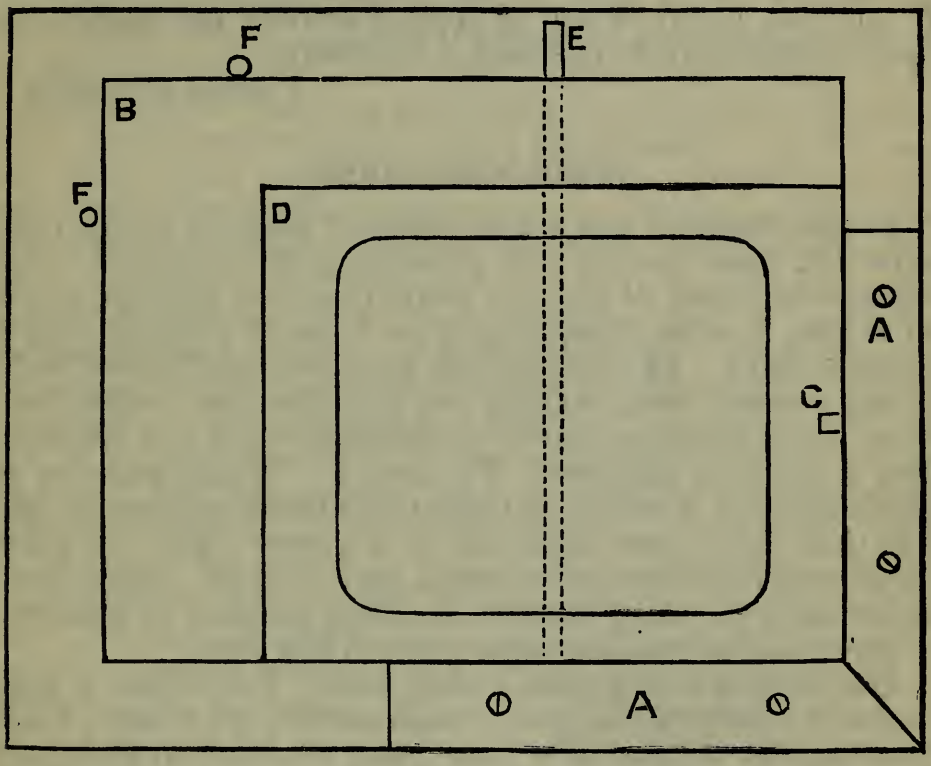
Louis Clarence Bennett.

A CUTTING-BOARD FOR LANTERN-SLIDE MATS.

The following described little device is one that I have used for some time in cutting paper mats for lantern-slides in connection with the usual metal form and Robinson trimmer.

The idea is to assist in holding the form down securely upon the paper while cutting the mat, and avoid any mishaps caused by its slipping before the operation is complete.

It is simple in construction and will, I think, be found a convenience by those who prefer to cut their own mats for this purpose.



Referring to the figure, it consists of a base-board $\frac{3}{4}$ inch thick and of any convenient size, mine is 5 x 6 inches, on the lower left hand of this are fastened the guide-strips *AA*; these are made of wood, $\frac{1}{2}$ inch square and $3\frac{1}{2}$ inches long. In the angle formed by these guides is placed a piece of "double-strength" glass, 4 x 5 inches *B*, which is loosely confined by two pins at *FF*, and rests at *E* upon a little strip of wood $\frac{1}{8}$ inch thick, glued to the base-board and forming a fulcrum for the plate, allowing it to be tipped up on the right hand side against the stop at *C*. This stop may be a pin or wire staple driven into the end guide-strip, at a distance from

the surface of the base-board to be determined by the thickness of the glass plate used; ¼ inch will be about right if the glass is ⅛ inch thick.

The manner of use is as follows: The paper is first cut into squares of suitable size, and, by depressing the right-hand side of the glass plate *B*, one of these squares is placed upon the glass in the angle against the guides *A;* the metal form *D* is then slipped into position on the paper, as shown in the figure. On now applying pressure to the left-hand side of the form the glass plate tips, bringing the right-hand side against the stop *C;* it is held securely in this position until the opening in the mat is cut, when, by slightly shifting the fingers, the outside edges may be trimmed if necessary.

Thomas Kennedy.

THIN NEGATIVES.

It often happens that a thin, shadowy negative results from even the most careful and painstaking development. The negative contains all that you desire to secure, perhaps, but is so lacking in strength as to give no hope of yielding even a passable print. The subject may have been one impossible to obtain a second time, making the negative that "might have been" even a greater source of disappointment and vexation. But is the case hopeless? Far from it. With a negative so thin that there is merely an indication, almost colorless in fact, but that upon close inspection in a proper light will show detail and slight gradation, much may be done. Not a good result only, but many times an excellent one may be obtained.

First make a bromide paper print *in this way:*

Use an inch-wick kerosene *lamp* flame. Let it burn as high as it will without smoking—perhaps an inch and a half. Place your light at the end of a clear piece of board or shelf, and measure off two feet from the flame toward the other end, making a distinct mark to guide in future operations. Upon this line or mark rear the printing frame containing negative for exposure, having interposed—say, about six inches from the flame—a sheet of opal glass.

Do not use ground-glass, as that has a tendency to concentrate the light toward the centre, leaving the corners weak, while opal glass seems to diffuse the light evenly over the negative. Time of exposure will vary from twenty seconds to six or even eight minutes. The secret of success here, as always with bromide paper, being in a long exposure to a soft

light. Develop with the usual oxalate developer. The image *must* come slowly and will be under perfect control as to strength. Having secured a satisfactory print, tack it on a board and re-photograph it, using a slow plate.

The perfection of the final negative must depend, of course, upon the skill of the workman, but probably very encouraging and fully repaying results will follow in most cases.

Frederick A. Jackson.

THE DEVELOPMENT OF SHORT EXPOSURES.

It will sometimes happen that a much valued subject has been taken with an exposure too short, or that the light proves to have been feebler than was thought in the taking of an "instantaneous" picture, and that the photographer is called on to use his utmost skill to save the negative. In this case the development ought to be made with the carbonate of potash, rather than the soda salt, and as soon as the operator finds that the exposure has been too short he should weaken the pyro element in the developer and add the alkaline to the fullest extent possible without fogging. And if, as I am supposing, the exposure is not sufficient for a normal development even under these circumstances, he should throw off the developer as soon as it becomes discolored or muddy, and wash the plate clean, after which recommence with a new developer, and so on with two or three doses, if necessary, until the details are all brought out, or the shadows begin to veil, after which nothing can be gained by pushing the development, for the density of the shadows will increase with the development of the lights and half lights, and nothing will be seen in the print of the apparent improvement, if any. It is in such a case that the great advantage of the use of the sulphite of soda is to be found, as the developer maintains its efficiency until it begins to decompose, which, with the pyro pure, is very soon, while with the sulphite it resists the decomposition for a long time, as we all know. And with all the experience of new developers, and the exaggerated reports of their power and the consequent shortening of the exposure, etc., etc., it is on pyrogallic acid that we must depend in all cases of the greatest force that can be obtained and, therefore, for the best developer for short exposures, where the power of development is required to the maximum. In my own experience I have found no advantage in the substitution of any other developer for pyro, though hydrokinone is cheaper. *W. J. Stillman.*

PHOTOGRAPHY IN ANTHROPOLOGICAL WORK.

Nor every good photographer knows just what is desirable in a picture for a scientist's use. The anthropologist depends so much upon his photographic friends for his material that we have thought it worth while to suggest some points in reference to what constitutes a good picture for anthropological use.

In the Indian Commissioner's office at Washington are hundreds of photographs of Indians from many tribes. As photographs they are good, but scientifically they are almost all without value. They are mainly two-thirds or three-quarters face views. From them one can gain no real idea of the race type or tribal character. Now good pictures of the different races are very desirable. What is wanted is a full face and a straight profile of each individual who will consent to let himself be photographed. One person only should be taken on a negative, and the portrait should give every possible detail of feature. The two portraits should be mounted side by side on a single card. A convenient size for these negatives is 4 x 5, and the portraits should simply give the bust. Any photographer, professional or amateur, who should make a good series of such photographs of men, women and children of all ages in any singe Indian tribe would do good service to science.

There are thousands of mounds and earthworks in the Ohio and Mississippi valleys. There are, however, almost no good photographs of them. There are difficulties in getting such, many of them being so large that a near view will not give satisfactory results. Of such earthworks we need, first: a picture taken from a carefully selected point of view, showing the whole structure with its surroundings. Second, other views on a larger scale, showing any structure details, such as gate-ways and the like. Photographing of mound excavations is an art in itself and should be done only under direction of the excavator.

Visitors to Indians and other barbarous peoples are fond of photographing "groups." A number of men, women and children are huddled together, and the shot is made. Such pictures are popular, but have little scientific interest. In all barbarian villages there are, however, many scenes that are worth taking—a man netting, a boy raising a blow-gun, a boatman paddling, a woman carrying burdens with the carrying strap, a primitive potter at work. Such things, if well taken,



Ch. Ehrmann, Photo.

Wm. Kurtz, Engraver.

HEAD OF SENECA INDIAN

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without interfering with the work or the attitude of the worker are very desirable.

Ethnographic objects are often photographed. Several points are of importance in such work. The background should be very plain and simple; shadows must be avoided; there should not be many objects in one plate; their arrangement should be simple, but as artistic as the material will allow. The most difficult material to deal with is osteological—skulls, skeletons and individual bones. Skulls are the pieces most commonly taken. A skull may be instructively photographed in five positions: profile, front, rear, directly from above, directly from below. These taken squarely have a definite value, and any skull really worth photographing should be taken in all five of these positions. No more than one skull should ever be photographed upon one plate. A recent work in archæology gives a full-page plate from a photograph of two skulls and three jawbones. The plate has absolutely no value as the specimens are not in suitable positions.

These hints are thrown out in the hope that they may suggest new lines of work and correct methods to photographers. The time may come in America, hail the day, when in all our public museums of ethnography and natural history professional photographers shall be in the employ of the institutions. When that time comes they will no doubt emphasize and expand these brief suggestions.

Prof. Frederick Starr.

SOME THINGS THAT CANNOT BE PHOTOGRAPHED.

There is a phase of photography that has not been much dwelt upon. It is concerning some things that we cannot photograph. We have all had the experience of trying to transfer to the photographic plate the animation and the loving expression we have so much admired in friends' faces, and with the result of a picture that has the stolidity of an Indian and the repose of an Egyptian mummy.

We observe a scene that we think has picturesqueness and life about it, but as soon as the camera is turned upon it the persons in it become conscious that their pictures are being taken and assume the rigidity of posts. The rare combinations of atmospheric and water effects in the light of the sun in the early morning give a peculiar brilliancy to Chautauqua Lake at times, but when transferred to the photographic plate

the charm is gone, and the bald picture only is there. The photograph of a lightning flash is but a serpentine streak across a plate, but the grandeur of the lightning in combination with torrents of rain and surging mountains of white capped water, such as I expeienced recently on the Atlantic, cannot be caught by the photographer. People who are not photographers will often call your attention to broad expanses where the view will range over a field of vision for ten or twenty or more miles, and will incite in the beholder the pleasurable sensations that come from looking upon such a scene, But when you attempt to transfer it to the sensitive plate how disappointing is the result as the distant mountains and forests melt away into nothingness! A few months ago I visited a group of coral islands. As we passed along in our small boat, with a glass pressed against the surface of the water to make it smooth, I could look down into the crystal depths for twenty, sixty or a hundred feet at one of the most royal scenes I ever beheld—a coral grove of trees, of waving fans, of fantastic forms glowing in the most gorgeous hues of Oriental imagery.

Oh! for a camera that could perpetuate the scene in its splendor.

A few days after I climbed a hill on one of the islands of this Bermuda group, where on one side I could look towards the ocean, and where, just below the surface of the water were the treacherous coral reefs. On the hill above, in times now past, the wreckers were accustomed to build their beacon fires to lure unsuspecting vessels on the reefs that they might profit from the disaster sure to follow. Where I then stood has been since erected a light-house, which threw its warning rays far out oceanward and warned the approaching vessel of the dangers in its path. To the north stretched a galaxy of islands numbered by scores.

But alas, as I planted my camera to take the view the gathering clouds shut out the sun, and the falling rain gave faint hope of photographing the scene before the darkness of night, as the sun was now well down towards the horizon. But as I waited the clouds seemed to part as if by magic, the sun streamed forth for a moment gleaming over the waters and transferring to them hues of green, and blue and purple, and shifting to darker and lighter purple, the green melting into blue and the blue into green as the passing clouds cast their shadows, and a rainbow of exceptional brilliancy crowned the islands and found a resting place far out in the sea. I have

the picture I then took on the photographic plate, but it is not the one that my eyes rested upon resplendent with so much that photography cannot reproduce. While there are some of the richest and finest of things we cannot photograph, the memory and the imagination will often suggest them as we look upon the picture. The true photographer will cultivate the inner artistic sense, and will seek to see and preserve by it beauties that can neither be described in words nor transferred to the sensitive plate.

A. M. Martin.

NOTES ON THE DEVELOPMENT OF BROMIDE PAPER.

Although comparatively new, as photographic printing materials go, gelatino-bromide paper has acquired great popularity, especially in recent years, and is now very largely used both for contact prints and for enlargements. It seems fair to assume, therefore, that a few practical notes on the development of bromide prints will not be without interest.

Every developing agent that has been used with any success for negatives seems also to have been tried for bromide paper. Rodinal or paramidophenol, eikonogen, quinol (hydroquinone), etc., are all said to have special merits from this point of view. The only bromide prints that I have been unable to distinguish from platinotypes were developed with quinol. The fact remains, however, that ferrous oxalate is still the developer most largely used for bromide prints, and it is noteworthy that preference is given to this developer by most if not all the large manufacturers of the paper. Not a few of the ordinary formulas are, however, open to serious objection. The stock solutions recommended are so strong that a comparatively small fall of temperature is sufficient to cause the crystallization of a considerable proportion of the dissolved salts, with a consequent alteration in the strength of the solutions. Frequently also too large a proportion of iron solution is added to the oxalate solution, and unless the latter is quite up to its nominal strength, there is precipitation of yellow insoluble ferrous oxalate.

The ordinary method of preparing the developer by mixing ferrous sulphate solution with potassium oxalate solution is the simplest and most convenient. The conditions to be satisfied are as follows: (1) The stock solutions must be of such strength that the ordinary variations of temperature do not cause the crystallization of any of the dissolved salt. (2) The

proportion of iron solution added to the oxalate must not be so great as to cause any precipitation of ferrous oxalate. (3) The developer must be as strong as is consistent with the foregoing conditions, but must not produce general fog.

Many experiments made under varying conditions and with paper from varying factories lead me to recommend the following proportions, which satisfy all the conditions laid down:

IRON SOLUTION.

Ferrous sulphate.....1 part by weight
Water *up to*.....4 parts by measure

OXALATE SOLUTION.

Potassium oxalate.....1 part by weight
Water *up to*.....4 parts by measure

Add 1 part of the iron solution to 4 parts of the oxalate solution. As a rule potassium bromide is necessary in order to keep the whites clear, and 1 part by weight of the bromide to 500 parts by measure of the iron solution will usually be sufficient. The bromide may conveniently be used in the form of a 1 in 10 solution. It is a fact of some interest that, according to my invariable experience with several different brands of paper, rather more bromide is required to prevent general fog with rough-surface papers than is necessary with smooth-surface papers from the same factory.

The addition of an equal volume of water to the developer mixed in the proportions indicated has no effect beyond slightly increasing the time required for development, and producing a deposit very slightly warmer in color. More water or a larger proportion of bromide makes development considerably slower, and tends to give an image of a browner color.

It is not sufficiently recognized that the production of bromide prints of the best quality requires not only a suitable negative, but also considerable accuracy in timing the exposure, so that development may proceed rapidly. The longer the paper remains in the iron solution the greater uncertainty is there as to the color of the image, and the greater is the risk of stains.

It is a point of prime importance to remember that the prints should never be placed in water immediately after removal from the developer; they should be put into alum solution acidified with dilute sulphuric acid or dilute oxalic acid solution. In this way precipitation of a yellow basic iron salt,

with its consequent yellow stain, is prevented. At the same time the print must not remain too long in the acid solution, nor must the same quantity of solution be used for a large number of prints, since the iron salt carried over from the developer rapidly changes to a ferric salt, and the latter seriously reduces the prints.

Finally, the disagreeable stains resulting from the introduction of the smallest trace of hypo into the developer necessitates the greatest care to prevent any contamination with this substance. Any splashes of hypo solution on the working bench from a previous operation must be carefully cleaned away, and the towel used for wiping the fingers during development must be quite free from hypo. Use a fresh quantity of hypo solution for each batch of prints, but do not begin to fix or pour out the fixing solution until the last print of the batch has been developed and cleared. Thorough fixing and washing after fixing is a very important element in the permanence of the prints. It pays in the long run to take the trouble of putting the prints into a fresh quantity of hypo solution after they seem to have been fixed in the first bath.

C. H. Bothamley.

THE ZEISS ANASTIGMATIC LENS.

The optical works of Karl Zeiss, of Jena, till recently solely engaged in the manufacturing of microscopes and magnifiers, have with the co-operation of Professor Abbe and Dr. Rudolph constructed entirely new photographic objectives. Professor Abbe, who had undertaken and succeeded in the difficult task of making compound microscopes, had applied his extensive experience also to the construction of photographic objectives. Through the aid rendered by glass technics, and especially the personal effort of Dr. Schott, of the same place, whose excellent flint and baryta glass have become known so favorably, the undertaking was much promoted. Not less than forty varieties of special glasses, of which about one-half is made into microscopes, and the other into photographic lenses, are manufactured by that firm, and their enormous luminous power has much contributed to successes in scientific examination, for example, to those of the bacteria.

There is neither in nor out of Germany a firm transacting such an enormous business in the manufacturing of purely scientific instruments as that of Karl Zeiss, who employs over

500 artisans and workingmen who, distributed in different departments of an extensive complexus of buildings, perform the different operations required.

Crude glasses to be wrought into lenses are delivered to the factory either in large blocks, cut first and given a superficial form by emery grinding, or they are furnished in pressed pieces, of approximate lens form and size. Before being subjected to further work, these pieces are carefully examined as to their quality and properties.

Brought into an automatic grinder, the roughly shaped lens is given the required form, as intended by previous calculation, and highly polished also in an automatic apparatus. It is very interesting to see how the finished lenses are tested and examined. For every radius of curvature for every lens' diameter there is a highly polished and accurately constructed test-glass. When a lens does not exactly answer to the test the well-known Newton color-rings appear, an infallible sign of the lens being imperfect, or of errors in its form. Every single piece is thus tested without the expense of much time.

Grinding and polishing is done by grinding-files moved by steam-power. The lens is fastened upon a vertical wheel and cemented in a corresponding steel-plated case, another similarly constructed case, supplied with emery paste or burnishing powder, moving above it in regular vibrations. The constant and regular function of this apparatus is under the care of a workman.

Mountings of objectives, their flanges and stops, are cut upon the turning-lathe and finished in another part of the establishment. This work is done with extreme neatness and accuracy; so are, for example, the apertures for diaphragms carefully cut and centred in the crude metal, not roughly bored in the finished plate.

To mostly all the larger objectives iris diaphragms are attached; the medium-sized are furnished with Waterhouse and the small ones with rotating stops.

Finished objectives, ready to be placed upon the market are first carefully tested in the photographic atelier attached to the establishment, and mainly so for their anastigmatic properties. To attain to perfect results, a large white board is erected in vertical position on one end of the atelier, and upon it are drawn lines and stripes of peculiar pattern, horizontally, vertically, and under angles of 45 degrees crossing each other from both sides, excellent means to test the anastigmatism of a lens. The different results obtained with anastigmatic lenses and

those aplanates manufactured by otherwise most reliable firms are especially striking, when the test-board is placed in somewhat oblique position. These differences in form and shape of figures produced are of the highest interest, and dealers in photographic objectives, or those intending to purchase any should not fail to apply the same test. Although the better class of aplanates are capable of reproducing geometrical figures correctly, they can not possibly eradicate errors, very easily obviated by anastigmatic lenses. So it may occur with ordinary lenses that small squares (3 to 5 m.m. the side) outlined with heavy stripes of black color, appear black in the reproduction instead of white, or instead of square are hexagonal in form, and when heavy lines, horizontal or vertical, alternating on the same plane are focused sharply neither the vertical nor the horizontal appear so in the reproduction.

Anastigmatic lenses are free from such anomalies, they furthermore permit the most uniform distribution of light, and in consequence thereof instantaneous exposure with stop *F*/18. Newer lenses of similar description do the same work with stops *F*/7.2, *F*/6.3 and *F*/4.5. The latter, a doublet, consists of five single lenses and is well adapted for instantaneous work. Being mounted in the very light aluminium this lens promises to become very popular among amateur photographers.

Johann Zacharias.

THE PAPER OF THE FUTURE.

My experience with gelatine paper extends back over the past two years, and has been largely on the line of experiments. I have given nearly every gelatine and collodion paper on the market a careful trial, but am fully convinced that gelatine is the paper of the future. Like many others, I have had all the trial and tribulations of yellow tones, soft films, &c., but I found that in nearly every instance it was *not* so much the fault of the paper as my own manipulation.

Those of us who changed from wet to dry-plates experienced many trials. We had to *learn* to use the "new-fangled things." So it is with gelatine paper. One must not —*cannot*—be careless and expect success.

For a long time I was strongly in favor of a combined bath, because I had had so much trouble with the film becoming

soft in the preliminary washing, where a separate toning and fixing process was used.

With a combined bath a serious trouble presented itself in the form of yellow or sulphur tones.

The combination of alum and hypo caused a liberation of sulphurous acid, which caused a "sulphur tone." I overcame this by using a "substitute" for alum which is free from the troublesome acid, and is probably known to most of you under the name by which it is sold, viz., "substitute."

While I have advocated a combined bath, and do still for most papers, I *greatly* prefer a separate toning and fixing, for aristotype paper. The gelatine paper comes the nearest to giving us the good old albumen tones, with a richness and delicacy that is unsurpassed by any paper in the market. By using a separate toning and fixing process, as per instructions, using acid sulphite of soda in fixing-bath, one gets *absolutely* pure and permanent whites and the most beautiful tones, ranging from a delicate, so-called "aristo tone" or rich sepia, to a black.

The *separate* toning and fixing gets rid of those *false* tones in the edges of the vignettes which is so apt to occur in using a combined bath. The nature of the film of this paper is such as to render it absolutely safe to wash thoroughly before toning, without fear of softening the film.

Be careful, neat and thorough in all your manipulations with gelatine paper.

Never use warm water any more than you would with dry plates.

Keep *all trace* of hypo out of your preliminary washing and toning or you will have yellow stains.

Wash *thoroughly* before toning and after fixing.

Don't try to make "acid sulphite," you can't do it. Buy it, it's *cheap*.

Stack and mount your prints same as you would albumen prints, but *don't* stack them after mounted. Lay out to dry separately. Let them get *bone* dry, and use a *hot* burnisher.

Gelatine paper is far more simple to manipulate than collodion paper and gives a stronger, richer print, and if one is careful and neat it yields unrivalled tones and finish.

W. B. Glines.

A COMBINED UNIVERSAL DEVELOPER.

New developing agents keep coming to the fore; some to leap suddenly into prominence, only to fall as rapidly from grace; others winning their way into favor by reason of merit, and retaining their hold upon the popular esteem. Among the latter may be enumerated hydroquinone, eikonogen, and para-amidophenol, each of which possesses some qualities of its own, rendering it of particular value for certain purposes, but each in turn having some inherent defect which limits its usefulness in other directions. Thus hydroquinone, as usually prepared, is exceedingly slow in action, but gives ample density and good printing negatives, if one has time and patience at command to wait upon its motions. Eikonogen is rapid enough, but usually fails to give sufficient density, while para-amido is very similar in behavior. But it so happens that all these agents work very harmoniously in concert, and with such uniformly excellent results as to negatives, glass or films, lantern slides and bromide paper as to place at our disposal a clean, economical, and easily prepared developer, which may well be designated universal, so far reaching is its usefulness. The formulæ for preparation and methods of using may doubtless be varied almost indefinitely; but having had uniform success with the following, I am led to record it for the possible benefit of some of the numerous readers of The Times Annual.

As usually prepared, the developer consists of two solutions as follows:

A.—Soda sulphite, granular	20 grains
Soda carbonate, dried	10 grains
Eikonogen	8 grains
Hydroquinone	4 grains
Water, distilled	4 ounces
B.—Soda sulphite, granular	20 grains
Soda carbonate, dried	10 grains
Para-amidophenol	5 grains
Water, distilled	4 ounces

In using, solution A is flowed over the plate and allowed to act upon the sensitive film until details are well out. When freshly made a few drops of solution of bromide of potassium or sodium may be added to guard against possible over-exposure. If exposure be timed correctly the development will be moderately quick, just about right for accurate judgment of results as it proceeds. When the details are apparently all out pour off the solution and replace it with B, when

a surprising and rapid addition to both detail and density will be observable and the desired end can be quickly reached. In making lantern-slides this action is specially marked, the result being clear glass where wanted and wonderful detail and transparency in the shadows.

The developer should not be thrown away when work is done, but filtered into a bottle just large enough to contain it, and which should be kept tightly corked. This will keep almost indefinitely, preserving its activity in a remarkable degree. When weakened by long use its activity may be restored by the addition of a few drops of solution B. It works equally well with bromide papers, giving prints of a fine, warm color, much more pleasing than the cold tones produced by ferrous oxalate. In short, it is truly a *universal* developer, and as such is earnestly recommended to all workers. An acid fixing bath is recommended.

W. H. Walmsley.

TONING OMEGA PRINTS.

I BELIEVE Omega paper has many desirable qualities, but it goes without saying that nine sheets out of every ten manufactured never produce good pictures. Some of it is spoiled in printing, but by far the larger part of it is spoiled in toning.

A few months since, I went into the establishment of one of our leading photographers, and asked the proprietor if he could supply me with some Omega paper. He said: "Oh! Ah! yes." And after a short pause he repeated his *yes* with some emphasis and added: "But did you ever use any of it?" I told him I had, and he then asked if I succeeded in toning it. When I told him I did, he said: "Well, we can get the paper for you if you want it, but we don't have much success with it here."

For the sake of getting a consensus of opinion on the subject, I went, a few weeks later, to another leading photographer and asked for Omega paper. He said he had some that he had had on hand about six months. He would not warrant its condition, but said if I wanted Omega paper, I might as well have it old as new, for it would not tone anyway.

These men are both practical photographers of more than twenty years' experience, and they both make excellent pic-

tures on albumen paper. I found upon further inquiry that in trying to tone Omega prints they had both used the combined toning and fixing formula which accompanies the paper.

Their experience is the experience of hundreds of others. I do not assume that the combined bath cannot succeed, but I am ready to affirm that in order to make it succeed, the operator must work with great care and within very narrow limits.

The first difficulty to be guarded against is sulphuration.

Sulphuration takes place in the combined bath either in presence of lead salts or in presence of alum. The reactions are somewhat complex and might prove uninteresting here. Those who wish to study them will find them in an article by E. Valenta, in *The Photographic Times* for July 1, 1892. The final steps in each series of reactions are the liberation of sulphurous acid, which blackens the silver in the print, and sulphur, which is deposited in the film, giving the whites a yellowish or muddy appearance.

There are those who like the combined bath because it tones so rapidly, but the increased rapidity of the process is due in every case to sulphuration.

Now, I do not intend to discuss the durability of sulphur tones. That may be a question which admits of some discussion; but the appearance of sulphur tones as compared with genuine gold tones ought to convince the casual observer that sulphuration is not desirable.

In considering the other difficulties, let us remember that two processes must be conducted. The print must be *toned*, and it must be *fixed*. Now, it is obvious that one of three things must be true. Either the two processes go on simultaneously and are completed at the same moment, or else the print is toned before it is fixed, or else it is fixed before it is toned. The first of these three results cannot be expected in a combined bath if the bath is used repeatedly, or even if it is used to tone a large number of prints; for even if the conditions are exactly right at first, they will change as soon as a few prints have been toned. To suppose that they will not, is to suppose, in the first place, that the lights and shades in every picture in a miscellaneous collection are so related to each other as to demand gold and hypo in the exact proportions in which they exist in the bath; and secondly, that the two processes which take place go on with equal rapidity. Both of these suppositions are contrary to fact. We therefore believe that the majority of prints put through the combined bath are either toned before they are fixed, or they are fixed

before they are toned. Now, it is evident that if they are toned before they are fixed, and taken out of the bath when they are toned, they will never be properly fixed, and will therefore fade. If, on the other hand, they are fixed before they are toned, then the only subsequent change of color that can take place is due to sulphuration. A combined bath can only succeed in the exceptional cases when toning and fixing proceed with equal rapidity.

Professor Ehrmann's combined bath succeeds because it is free from lead and is always fresh. Professor Ehrmann prepares a fresh bath every time he tones, and throws it away when he has used it once. By this method he avoids the evils which attend the repeated use of a combined bath. It should also be remembered that although Professor Ehrmann's bath contains alum, it is freed from sulphurous acid and sulphur after the reaction between the alum and the hypo is complete, and before the bath is used. It is also a fact worth noting, that Professor Ehrmann, in his article in last year's ANNUAL, on "Chloride of Silver Gelatine Emulsion Paper," says: "It is much safer to tone and fix separately."

Omega prints can be toned beautifully and easily in a plain gold bath, and then fixed perfectly in plain hypo. Do not let the desire to simplify the process lead to the use of an unsafe method. If your prints are worth anything, they are worth the time it takes to tone and fix them in separate baths.

A. C. Longden.

PRINTING WITHOUT FUMING.

IF equally as good results can be obtained without fuming sensitized albumen paper with ammonia just before printing, it is but a waste of time to continue the annoying and troublesome process.

I am well aware that fuming is a time-honored custom, and for that reason alone it is hard to make the greater number of photographers believe that good prints can be made without it.

So many years have elapsed since I have fumed the paper used in my regular practice, that I would have forgotten such a process ever was used, had it not been that during these years I have been engaged in investigating silver printing on albumen paper and the many ways in which it is practised. My observations lead me to believe that the advantages derived from fuming are few, and are mainly, a more rapid print-

ing quality in the paper, and greater brilliancy in the finished print. Next to these comes perhaps the fact that it sometimes destroys a tendency in the paper to print measly. On the other hand, if a photographer is hurried, it seems like a useless waste of time to be obliged to wait the twenty or thirty minutes which paper must remain in the fuming box, and as the temperature of the surrounding atmosphere has a great deal to do with it, the results are liable to be very uncertain. In extreme hot weather in some parts of the South, where the atmosphere, although hot, is very humid, it is almost impossible to keep the paper from turning brown while being fumed.

The remedy for this and many other evils is in the bath, and is very simple. Discard the ordinary silver bath and use one made as follows:

Nitrate of silver	50 grains
Nitrate of ammmonia	30 grains
Water	1 ounce
Liquid ammonia (full strength)	3 minims

Make up the same quantity that you usually use for a bath, and mark the height of it with a three-cornered file on the outside of the bottle in which it is kept.

After all the salts have dissolved, test it with the hydrometer and make a record of the test. Add silver every day or so when it is being used, to keep it up to this test. Try it with litmus paper occasionally, and keep it slightly alkaline, by adding a few drops of liquid ammonia if necessary, but never add nitrate of ammonia except when the quantity of the bath is decreased from use—every sheet of paper takes some of the liquid from a bath—then a measured quantity of water should be added to bring it up to the mark on the bottle, and for every ounce so added put in 30 grains of nitrate of ammonia, 50 grains of nitrate of silver, and 3 drops of liquid ammonia. After the salts have dissolved, test it with the hydrometer as in the first place, and if necessary add more silver to bring it up to the registered test. This is all the care the bath ever needs. It does not even require to be filtered. The little albumen which gets in it from the paper is precipitated in small round particles which gather, and carry down with them all the other impurities which may be in the bath.

One minute is long enough to float paper on this solution, and it is ready to print from just as soon as it is dry, no fuming being necessary.

Any toning bath that works well with the standard silver

bath will work equally well with this, while the range of light and shade, and the brilliancy in the resulting print, is greater than can be obtained by any other process on albumen paper that I know of. Besides avoiding the annoyance and loss of time in fuming, the use of this bath presents many other advantages which could only be properly mentioned under another heading, but which will soon be discovered by any one, professional or amateur, who gives its use a trial.

Harry Platt.

TONING—A FORMULA AND A PRINCIPLE.

In trying to reconcile the various toning formulas with my own observation and experience, I have come to certain conclusions as to conditions of working not generally touched upon by formula-makers.

First. Thus, it is a mistake to confound the strength of bath with the amount of gold contained in a bath. For instance, two grains of chloride of gold in a pint of water will tone two sheets of paper, but not two grains of gold in half a gallon of water. Thus, when we are directed to "use sufficient water and add gold according to number of prints," this may be good practice, but it is not good precept, because it does not take into account the proportion of water to gold, which any two operators might consider "sufficient."

Second. Some tests I have made showed me that a so-called spent toning-bath still contains about half the amount of gold originally added. This gold was recovered by precipitation and actually weighed as metallic gold.

Third. A weak toning bath will keep up the action started by a strong one. It therefore follows that if a large number of prints is put into a fresh bath, or one of full strength, a larger number can be toned than if half the batch had been put in at first and the rest after these were finished, and the bath consequently had become impoverished.

Fourth. Temperature and gold are to an extent interchangeable items. A bath rather weak, but at 90 deg., will work equally as well as a strong one at the ordinary temperature of 70 deg.

Fifth. The greatest economy of gold results, without detriment to the prints, by using the toning bath over and over again, with addition of gold in proportion to the amount of paper to be toned.

The principle to be impressed is, that the strength of toning bath—the proportion of gold to solution—controls the toning, not the absolute amount of gold present; and that this gold can be made to do the most work by repeated use of the same bath; by regard to proper temperature and by the toning of a considerable number of prints at the same time, when the solution is still of full strength.

As to the formulas, there is a legion to choose from; but all agree pretty closely as to the proportion of gold and toning solution, and have another peculiarity in common that they will give the best tones with the best negatives. Quite a common proportion is one grain of chloride of gold to eight ounces of solution. The following formula and method of use I have found employed by several professional friends, and I therefore disclaim originality, and likewise disclaim the name "acetate bath," by which it generally goes, but which applies to another set of formulas altogether, containing no alkali, and which I have found to work extremely slow, even when following exactly the instructions of thoroughly reliable writers. The toning bath is a combination of the "acetate" and "sal soda" bath of the following formula:

Water	14 ounces
Acetate of soda	30 grains
Common salt	10 grains

Make up separately:

Chloride of gold	2 grains
Water	2 ounces

Strong sal-soda solution added till it turns red litmus paper blue. Mix the two solutions and they are ready for immediate use. An 8 x 10 dish is suitable for this quantity of solution. In summer it tones at the ordinary temperature, and in winter I pour some four ounces into a granite cup, heat this to simmering and add the whole or part to the rest of the solution in the dish to bring the heat up to 80 or 90 deg. Fahr. About one sheet of paper in sizes up to 5 x 8 is all that can well be handled at one time. A second sheet can be toned after the first is done, but in using the bath for the first time, as above, it will then work slower and may possibly need a quarter of a grain more gold, neutralized as before. In using the bath afterwards, one and a half grains of gold can be dissolved in one and a half ounce of water, and neutralized. Of this solution half an ounce can be added to the bath before the first batch of prints is put in; say one sheet or less, and a further

half ounce for the second batch and so on. This will be gold enough for two sheets, helped out as it is by the gold still present in the used bath. I keep the same bath for some three or four months, by which time it is presumed that its original proportions have become somewhat altered and a fresh bath is made. The old bath is acidified with sulphuric acid and precipitated with sulphate of iron also acid, in the usual way.

There is nothing unusual in the manipulation of the prints, they being put into weak salt water previous to toning, until the purple is seen to change to a brownish tint, which color turns to a red in a short time in the toning bath. The temperature and amount of gold should be so regulated that the toning is complete in fifteen to twenty minutes, neither much more nor less, for the best results.

Ottomar Jarecki.

ELECTRICITY AND PHOTOGRAPHY.

The connection of electricity and photography has, in many directions, become so intimate, that it is worth while to review what results have already been reached from this connection, and what further results we may hope to reach.

In this year of grace it is no fable to telephone, by electricity, an appointment to be photographed; to go by an electric car to a photographic studio; and, to be carried on an electric elevator, to an ordinary room, where a negative is made by the electric light; is developed in a room lighted with an electric lamp; is dried by an electric stove, and the positive is printed by electricity. And all this is done in a room heated, in winter, by electricity, and ventilated and cooled, in summer, by electricity. Nor do I think it is much of a fable to say, that this picture may be transferred, by electricity, across the ocean, to your friends in Europe, reaching there almost as soon as it is made here. There are very few of the more popular seaside resorts—Coney Island especially—where the business of photographic portraiture is not carried on after dark with electric light. In all cases where daylight is not available the electric light is a far better artificial light than magnesium, calcium or anything else. For photographing in theatres there is no comparison; magnesium is almost guesswork, the calcium light is not powerful enough, while the electric light is sustained, can be concentrated or diffused, and is so powerful that exposures of two or three seconds only are needed.



Miss Mary S. Turner, Photo. Photochrome Engraving Co., N. Y.

PREPARING FOR SCHOOL.

Here is a popular use of electricity in connection with photography, but the value of the connection from a scientific standpoint is much greater. Take, for instance, the registering of varying atmospheric conditions, firstly, by electricity, and then, their recordation by photography. Again, take the manufacture of all classes of pictures for printing in the daily journals. There is hardly an important paper in the country which has not its photographic plant, for working by electric light, both in the matter of making negatives and from the negatives in making relief plates. Again, take Mr. Muybridge's wonderful series of plates of "Animal Locomotion," which were made on photographic plates, of which the exposure was operated by the electric current, all other methods having been found ineffectual.

In my own establishment, that of the New York Photogravure Company, at 137 West 23d Street, New York, we use electricity more and more every year. We use it, of course, for lighting purposes, throughout the building; we use it in our dark-rooms; we use it for driving all machines that require power, for instance, our printing presses, saws, burnishing machines, pumps, ink mills, fans, etc. We use it, and are likely to use it still more, for heating purposes; we use it for ventilating purposes; we use it for electrotyping and depositing various metals; we use it for printing our plates on dull days; we use it sometimes for making negatives, believing that it gives more of an isochromatic effect than ordinary daylight. And, for the whole of these uses, there is simply one small copper wire, which is brought into the building underground, which is innocuous, and is supplied with all safety devices against fire.

And, as far as all these uses are concerned, it is, really, more economical than the older methods of light or power, for which it has been substituted, because, immediately we are through with its use for the special purpose on hand, the current is cut off, and our expense ceases. This has especially proven to be the case, in running our power presses, where, as a matter of fact, only a small portion of the day is actually consumed in printing. Moreover, the convenience of its use cannot well be estimated. It is a servant that is always at hand, day and night, that requires no coaxing, and, as far as our experience goes, is not subject to crankiness or temper.

Anschuetz, whose instantaneous photographic work in the same direction as that of Mr. Muybridge is remarkable, has used electricity in a very ingenious way for the exhibition of

his results in the Zoetrope. A disc of his photographs is revolved, and, as each picture on the disc is brought opposite the point of vision, an electric spark momentarily illuminates it. The rapidity of revolution, of course, makes the motion appear to be continuous, and the lighting of each figure on the disc by itself, by the electric spark, prevents the combination of two or three figures at once. Probably this is the best form of Zoetrope yet devised.

Edison has experimented in a combination of the work of his phonograph with a set of instantaneous photographs. In his method a strip of collodion or celluloid coated with sensitive gelatine passes through a miniature camera. As each new section of the film is brought into focus an electric spark lights the object photographed; at the same time a phonograph registers the sound. The roll of sensitive film being moved rapidly, a succession of images is produced, each one being illuminated by the spark, so that there is registered and obtained, on the one hand, in the Zoetrope, a continuous motion; on the other hand, in the phonograph, a continuous sound. Mr. Edison has been quite successful in producing in this way a person singing, a man talking, &c.

Electricity, in connection with photography, has been used in another direction with distinct success. Obernetter, of Munich, applies it in the formation by deposition of a metallic printing photogravure plate. The theory of his method has been frequently published.

Perhaps one of the most striking instances of what I may call the indirect combination of electricity and photography is in the photographic reproductions of lightning. It seems to me the results have destroyed the generally accepted theories of the formation of lightning, just as Mr. Muybridge's work destroyed the generally accepted theory of the motion of horses, etc.

There are many other directions in which photography and electricity have been combined, but perhaps I have touched on the most important. For the future it would seem to me that it offers a most promising field for the permanent registration, in an exact, scientific way, of all classes of motion. One of the oldest experiments with the electric spark is to light in darkness a rapidly revolving wheel, when, from the shortness of the duration of the spark, the wheel appears to be motionless. I think that in this direction there will be a very great deal done in the near future, and it is in this direction that I would advise experimenters to work. It hardly seems possible to

know where the uses of electricity will stop. In Twenty-third street, New York, an electric conduit was laid by the Edison Company, sufficient, as was claimed, to supply the wants of the whole street for years. I ventured to assert that it was not half large enough, to which the reply was made: "It will carry all the lights that ever can be used in this street." Even at the present time lighting is but a very small portion of the various uses to which electricity is now being put, and my prediction has already more than come true.

Ernest Edwards.

FOG.

As I have been devoting what time I have had for the practice of photography during the the past year to a study of the kallitype process, I was in hopes on receiving your invitation to contribute to THE ANNUAL, of sending you something on that subject, but my time has been so occupied that I have been unable to complete my studies, hence I can afford nothing new in that line. I hope on the appearance of THE ANNUAL, however, to see that others have taken an interest in the same branch.

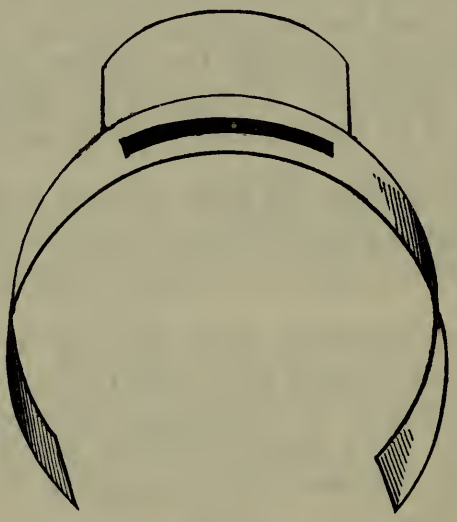
One thing that I have had time to meet with, however, has been fog, or perhaps FOG will more clearly conveys an idea of my trouble, a trouble that no doubt is ubiquitous in the photographic world.

Fogging in the dark-room, with care, can be avoided, but in one's apparatus fog "steals upon him ere he is aware." Perhaps the front board, or the bellows, or the holder is at fault. Wherever it may be a most insidious foe it is indeed, and must be tracked, pursued and run down if one desires to obtain good results.

So far as front boards, or other jointings in the box are concerned, an article written by Ottomar Jarecki, for THE ANNUAL of 1891, has been of great help to me, and I hereby tender thanks to Mr. Jarecki for the information contained in that article.

About a lens the diaphragm slot has always been a vulnerable point. To remedy this weakness I have devised the following little article which I believe would prove profitable on the market, and I hope to see it supplied by the trade, as I believe many another follower of photography would be glad to possess so convenient a relief from one of the most common sources of fog—the diaphragm slot.

This guard is constructed as follows: a piece of clock spring that has been annealed so that it may be bent as desired is cut of such length as to be a little longer than half the circumference of the lens barrel it is to protect. In the centre of this strip and longitudinally a slot is cut of the same length as the slot in lens tube, if it is to fit a revolving diaphragm, narrower if you choose with the Waterhouse diaphragms. The annealed spring is then bent in a circle to fit the tube, after which it should be again tempered. The spring should then be tried to see that it snaps over the tube and fits snug to same. A small sack is then made of any suitable material, such as black ladies' cloth or thin sheet rubber, which is made to fit and slide over the projecting diaphragm. If long flanges or flaps are left at the end of this sack, the width of the spring, and sufficiently long to reach around and inside the spring, also narrow flanges at sides of mouth of sack, the whole can be



easily cemented to spring; the long strips from ends of sack doubling over ends of spring and lining same so as to protect the barrel of the lens from being scratched.

With the foregoing described device the diaphragm slot is securely protected; the spring forming a trifle more than a semi-circle snugly clasps the tube of lenses and holds itself in place, while the sack covers the projecting diaphragm and prevents light entering. At the same time the whole may be easily removed when it is necessary to change the diaphragm.

As before stated, I hope to see an article similar to this quoted as are diaphragms, caps, etc.

F. C. Green.

NOTES ON ARCHITECTURAL PHOTOGRAPHY.

In the various photographic annuals, journals, etc., advice is frequently tendered on the subject of architectural work, and various hints given, some of them being very sensible and useful and others the reverse.

One detail which is seldom touched upon is the elevation of the camera when photographing a building.

When buildings of an ordinary height (say 50 feet or thereabout), situated in a street not less in width than the height of the building are dealt with, we find very little difference in the photographs taken by different men, but when those of six to twelve floors are in question, the variations in treatment are most noticeable.

Some will plant the tripod at the street level as usual. They will use a lens including a slightly wider angle than that ordinarily in use, and will take care that it is of a pattern which possesses a large field, and if raising the front of the camera does not bring the whole of the building on to the ground-glass, they tilt the camera slightly and render the now converging lines of walls, windows, etc., vertical by the use of the swing-back, thus producing a photograph which conveys the same impression as the original building gave to ninety-nine per cent. of those who were in the habit of looking at it.

Other men will seek the first, second, or higher floor of a neighboring structure, and from this point they will obtain a view of the whole of the building with the least strain on the lens, they will at the same time procure an excellent bird's-eye-view of the pavement, the tops of projecting cornices, strings, window-sills, etc., and if the building possesses a veranda they will undoubtedly get a realistic plan of the lead, corrugated iron, or other covering which forms the veranda roof (unless indeed they avoid the last calamity by means of an ingenious brick which will be hereafter described).

Now the latter is the treatment which a subject of this kind usually receives, and it has been recommended by some writers notwithstanding the fact that often it produces what is little better than a caricature of the building. It may be excusable when the person *must* have a photo of the structure at any risk, and when his instruments cannot stand the strain (very few of the cheap ones which are now used so profusely can); it may also be endured when a view of a particular portion of the building is required, and which can be obtained from no other point, for in this case the view may be of great

value for judicial or scientific purposes, such as comparison and reproduction of architectural detail, etc.; but when a general view of the building is required it is neither more nor less than an abomination, which should not be countenanced for a minute if it can possibly be avoided.

Often we see a tower or a church spire taken from a great elevation, but where such has been done by men of knowledge it has been with the object of showing the details of this portion of the structure, and as such it is of vastly more value to the student of architecture and archæology than one taken from the ground would be. Photographs of other individual details of the structure taken from the most suitable points would perhaps be included in the same series, but this set to be complete should include one or more general views taken if possible from the ground.

As a rule, buildings are designed with a view to their being inspected from the street or ground level, and a building generally looks best when viewed from this level. Projecting cornices and other details which are moulded and enriched underneath, are not placed below the line of sight, neither is expensive ornamentation indulged in on the flat upper surfaces of these same projections which cannot possibly be seen from the street. (This is the only part of the lower cornices which is seen in the photograph when it is taken from a great elevation, all the carving, moulding, &c., in the soffits being hidden.)

A great deal more might be written in order to show reason for the avoiding of this mistake wherever possible. It is possible in most instances, and, consequently, the practice should never be indulged in when the photograph can be obtained from the ground level, or from the same level at which the walls of the building intersect the line of the ground.

The brick mentioned in a previous part of this article came under the notice of the writer a few months ago; a reproduction of a photograph taken under the following circumstances, appeared in an architectural magazine: A building of some six or seven floors was photographed from two different positions; the ground and portion of the first floor was taken from the centre of the elevation at the street level; the whole of the structure above the roof of the veranda was taken from the first or second floor of a building opposite and the two were combined, a collotype print being taken from the "composite"; the effect was the same as would have been obtained had the upper portion of the wall been tilted forward

as if falling bodily into the street, the impression conveyed to the mind being ludicrous.

When work of this sort is allowed to ruin the surface of paper, it is little wonder that now and then we hear the accuracy of the work of the camera called into question by those who are not acquainted with all the resources for good and evil at the disposal of a tricky photographer.

J. H. Harvey.

MY TRIPOD.

If some genius would invent a tripod of the walking-stick shape which at the same time would prove really serviceable, he would confer a favor on the large army of amateur photographers. The average tripod at present in use by photographers is a nuisance. Surveyers long ago discovered this, and the tripods for their theodolites and levels when folded up are no thicker than the handle of a hay fork, and just as easily carried. The waking-stick tripod if rigid—which so far as the English model is concerned is not—would fill the proverbial "long-felt want." It has filled a want in other directions, however, for I once saw a stick that would hold nearly half a pint of *spirits frumenti*, and then again there is one fitted with lenses for use as a telescope. The former, however, was more in demand than the latter. But as a tripod for the support of a camera the walking-stick has not proved a success. A friend of mine, a Canadian newspaper man, writing facetiously one time on the subject of photography, said that it was the easiest thing imaginable to recognize an amateur on the street, because, said he, "he always carries a varnished bass-wood box in one hand and a bundle of sticks in the other."

Well, I have given up the yellow sticks. I shall now tell you how it came about. One day I was watching a company of soldiers "fixing bayonets," and the thought occurred to me "why could not three or four brass tubes be 'fixed' in the same way." I tried it. I got three brass tubes to slide one inside the other, the smallest being about a quarter inch in diameter. In the upper and largest tube was cut a slot of the same shape as that in a bayonet socket. On the end of the next tube was soldered a block corresponding to the sight block on a rifle, while at the other end of the second tube was a slot similar to that in the first. The last and smaller tube had another block soldered close to one end, and a solid spike inserted in the other. This completed one leg and two similar

ones constituted the tripod. The upper ends of the larger tubes fitted into a brass triangle, which supported a wooden disc, and this in turn held the camera. But this tripod was not sufficiently rigid, particularly for work on a windy day. This defect was overcome by attaching a strong string by means of a loop to the screw in the top of the tripod. When about to make an exposure the string was carried under the hollow in my boot and hauled taut by one hand, at the same time making my exposure with the other hand. It has worked admirably, but I think could be improved, perhaps, by adding the "locking ring" as used on bayonets. It has one great advantage, I think, and that is it is unaffected by rain or a damp atmosphere, as is the case with some sliding tripods. Then, again, it can be folded up, occupying such little space that it can be carried up the sleeve—in fact this is the way I usually carry it.

William W. Fox.

BENZOIN AS A NEGATIVE VARNISH.

Of the several negative varnishes I have used, the one I prefer is benzoin. It is easily prepared, durable, cheap, and I believe, free from all objections. I am not aware that it is in general use by photographers, hence I will advise those amateurs who might be dissatisfied with their varnish to try this one.

Ask your druggist for the resin, not the officinal compound tincture, remembering that there are two kinds in the market, the one consisting chiefly of whitish tears united by a reddish-brown material, the other without tears. The former is also called "benzoe amygdaloides" from the resemblance of the white grains to the fragments of blanched almonds. This is the most valuable, and the one to be selected for the varnish.

The peculiar fragrant odor of benzoin alone will enable one to readily distinguish it from other resins.

Having procured the benzoin, place it in a vessel containing absolute alcohol, and let it stand for a day, shaking it occasionally. The white tears will all dissolve, leaving the impurities at the bottom. Then filter into a clean bottle, which must be well corked, and free from water, which would form a milky liquid with the resin.

I have used two strengths, viz.: 10 per cent. and 5 per cent. It is not necessary to warm the negative before applying the varnish. Never pour the benzoin from the negative back

into the bottle without filtering it again. Have two bottles, and pour the varnish from one upon the plate, allowing the excess to pass through filtering paper into the second bottle.

By doing this you run little risk of having any impurities deposited upon the negative.

I have used this varnish for several years to my entire satisfaction. Negatives which I have coated with a 10 per cent. solution of benzoin in 1886, have shown no signs of deterioration, although they have remained for two years in a very damp place.

The benzoic acid of the resin is unalterable in air, and has mild acid properties.

Those who have not yet tried benzoin as a varnish might test its value for themselves, inasmuch as it is cheap, easily prepared and applied.

H. Phelan.

RODINAL FOR TRANSPARENCIES.

While it is not at all probable that rodinal will ever supersede pyro as a developer for negatives, still a good word has to be said for it when we come to deal with transparencies. I had occasion last winter to prepare a series of slides to illustrate a lantern lecture, and having made use of rodinal with excellent results in their production, my experience may induce others to give rodinal a trial for this particular kind of work. Nearly all my pictures were reductions from whole-plate negatives ($8\frac{1}{2}$ x $6\frac{1}{2}$ inches) and were obtained by a daylight exposure. Those who employ rodinal for the first time are pretty sure to lose their pictures by over-exposure. I found seven to ten seconds in a Lancaster reduction apparatus quite sufficient when using Thomas' lantern plates, and this when the light was by no means brilliant. The freedom from gelatine stain when rodinal is the developer is another valuable feature, while the transparency of the shadows is eminently suited for the class of work we are considering. The inky color of the silver deposited presents an appearance very closely resembling that of the old wet-plate transparency when the final operation of toning had been carried out by means of sulphide of potassium. I found the strength of solution most suitable for the development of the slides to be that recommended by the manufacturers of rodinal, viz., 1 part rodinal to 32 parts water.

William Lang, Jr.

ADVERTISING FOR PROFESSIONAL PHOTOGRAPHERS.

If I were asked to outline, as briefly as possible, the course which a photographer should pursue, in order to most speedily and surely arrive at success in his profession, I would answer simply: Do good work *and advertise.*

The photographer has heard so much about "good work," in one way or another, that I need not apologize for skipping this part of my subject, with the brief comment that, unless you have something thoroughly good to offer, it were better not to advertise at all. To advertise is to make known, and who would make known the fact that he was a failure?

As advertising is a field comparatively unexplored as yet by the average photographer, it may be well to draw attention to the three essentials of successful advertising, regardless of the particular industry to which it is applied.

To advertise successfully you must have good value, either of product or service, behind your advertisement; you must advertise judiciously: and you must advertise persistently. With these three conditions fulfilled your business is absolutely certain, according to the verdict of experience, to be a success. The success attained by Rockwood, Falk, Steffins, McMichael, Landy, Taber, and others whose names are "household words" among photographers, will be found by all who care to investigate to be due not only to the excellence of their work, but also to the careful and persistent advertising, direct or indirect, which has accompanied it.

Now, as to the different methods of advertising available. The photographer should always remember that his work is, of necessity, the most powerful advertising agent at his command. A clever photograph has greater persuasive power than any argument which can be written or spoken. In like manner a poor photograph does incalculable harm to the photographer whose imprint it bears. But the photograph alone is not all sufficient as an advertisement. Next in order of value comes newspaper advertising. By persistently keeping his announcement in the local papers the photographer will, in time, bring his business and work to the notice of every member of the community. If his advertisement is skilfully put together, and creates a good impression, much will thus have been accomplished. He has, as it were, made the acquaintance of a sufficient number of probable patrons to insure his prosperity. But that acquaintance must be renewed, must be cultivated, if possible at closer range. The readers

of the advertisement must be attracted and made to visit the gallery. Whether they spend upon their first visit is a matter of comparatively little importance, but it is desirable that they should make a visit, and pleasantly inform themselves of the personality of the photographer and of the attractiveness of his work. It is needless to remark that a favorable or pleasing impression given at this stage will insure a profitable visit from the recipient when photographs are desired.

How to attract the public to the gallery, whether as visitors or patrons, is a matter which deserves much more consideration than is generally given to it. Perhaps the most successful way is to establish and keep up the custom of "exhibitions" or "opening days" at the beginning of each season of the year, or at convenient periods. This plan has proved exceedingly fruitful and profitable in many cases which have come under my observation. It will readily be seen that such a departure not only keeps the public interested, but also demands, on the part of the photographer, a constant looking-out for novelties and attractions for each succeeding "view day," which is of practical benefit to him.

This leads me into another phase of newspaper advertising, that of obtaining what are usually called "reading notices." It is a curious fact that these notices, which, as a rule, are more valuable than regular advertising matter which has to be paid for, can generally be obtained free of charge, upon the one condition that the subject of the notice be of public interest and worthy of insertion under the heading of news. The obtaining of such notices requires, of course, a little dexterity in handling the newspaper men; but even the leading metropolitan papers readily give space to anything accomplished by a photographer which is of interest to the public at large.

After the newspapers comes the circular, which is, if properly managed, a very valuable agent for the making known of a photographer's business capabilities. This method, however, has been so much abused that to render it profitable in these days the circular sent out should possess something of originality, novelty, or value to insure attention. I have often wondered why photographers have not more extensively employed the photo-mechanical processes of reproduction for advertising by circular. The attractiveness of a clever pose, or of a beautiful face, in a photograph is almost irresistible, and, accompanied by a few well-chosen words from the photographer, should prove a profitable means of advertisement. The prints

for this purpose could be obtained at a very low figure by photo-mechanical means. Perhaps the best form of circular advertising, and the latest, is the "little book" idea. I have spoken of it as the latest, but it is merely a revival of an old notion. It consists in the compilation, in convenient size, of a few interesting facts concerning the business of the advertiser, written and printed in as dainty a fashion as can be afforded. A good example of this kind, issued some years ago, bears the title, "The Photographer to His Patrons, or Practical Directions to Photographic Sitters." It is full of interesting and helpful hints. Still better, and of recent date, is the charming little "Book of Beauty" issued by Mr. Rockwood, containing some beautiful illustrations. When ordered in large quantities these books do not unduly tax the photographer's pocket in proportion to the patronage they secure.

But I have already far exceeded my space and will say no more. The subject is one of great interest, and photographers will find it to their advantage to investigate its merits.

John A. Tennant.

HISTORICAL WORK FOR AMATEURS.

Among the many good things in last year's Annual nothing met my more thorough approval than the article on page 65 entitled, "Systematic Work for the Hand Camerist." Every amateur who has not become discouraged easily soon learns the profitless pleasure derived from exposing for the sake of exposing. When he has ascertained that he can rely upon himself to take a good landscape or picture, his interest ceases and his camera frequently accumulates much dust from want of use, save an occasional spurt, perhaps, when summer vacation arrives, and even then, want of practice makes its use more of a burden than a pleasure.

There is a need for some incentive which shall hold his interest to the work and ever prompt him to reach perfection in the art.

If at the outset he has laid out a line of work, as suggested in the article referred to, he is ever keenly awake to all he sees, and to its ready and efficient adaptation to some part of his preconceived idea or plans.

If one would succeed in any work, much practice is required. Interest must precede as well as follow in the work. Interest fails, and hence the work, if not prompted by some well-

directed plan or if some well defined purpose is not kept constantly in view.

These well-known psychological principles are as completely adapted to amateur photography as to any other vocation in life. I am confident many less failures and far better work would be accomplished by all who attempt it if they possessed a satisfactory motive for a stimulus.

It was the writer's desire, long before he took up the art of photography, to be in possession of views of the present condition of points of interest in the battlefields of our Republic and of all famous and historic buildings, or of anything connected in any way with our country's history lying along the line of reverence for the patriotism of our forefathers or ancestors. Many of these places are being destroyed or so converted to other uses as to loose their identity. The amateur can aid in preserving their memory and leave for succeeding generations a prize of no small consideration.

This line has been closely adhered to and, as a result, while not declining to step aside for a few of the finer views I have met with, I have and am still collecting many pictures of rare historical interest. But, alas, time and other duties, I fear, will not permit me to reach the ultimate conception I have planned and this with no wavering in my enthusiasm.

Just here it suggests itself, that perhaps there are fellow amateurs who have some historic views, or are so located as to easily obtain them, which they would like to exchange with me. If so, I will be pleased to receive a list of what they have or can get, from which I would select and return a similar list to them.

I would prefer, however, to limit the applicants to such workers as are capable of making a good negative and producing therefrom a satisfactory print. To such persons, of either sex, it will afford me pleasure to grant an exchange and to impart any further information in my power. I make this offer in this form to encourage a greater perfection in the art and to further the idea of instructive results of lasting value in lieu of pursuing the hap-hazard way of taking a few pictures of local interest which speedily leads to distaste for the art.

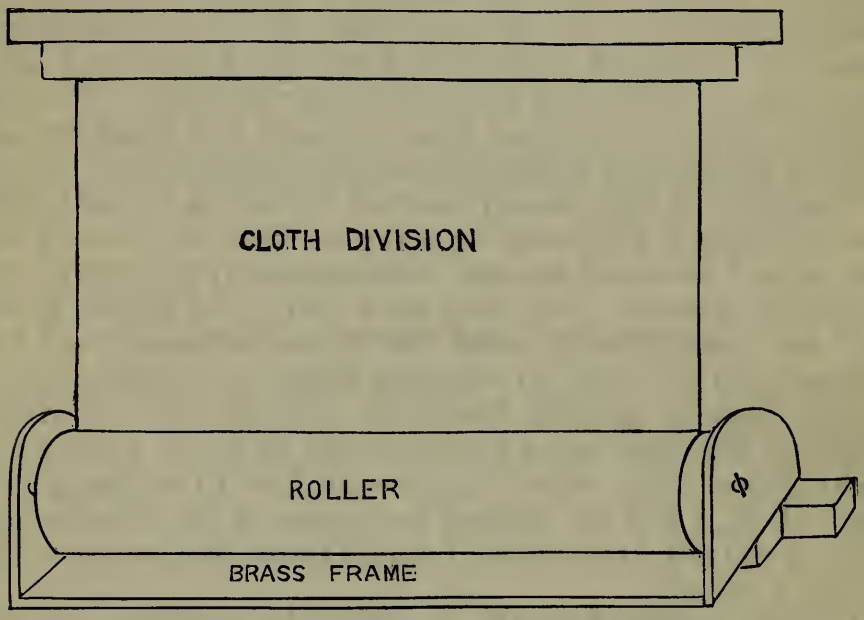
I find immense pleasure not only in photographic work, but also in the search for historical views in the neighborhood of my ramblings. From my opinion I feel as if I must give my testimony in substantiation of the good advice in the article referred to, and do all I can for the encouragement of workers in the art, and of the advancement of the ideas so powerfully

and graphically set forth therein. Those wishing to accept of my offer may address me at 524 State Street, Brooklyn, N.Y., enclosing a list of such subjects as they have and I will return to them a list, and designate the nature of the picture I wish.

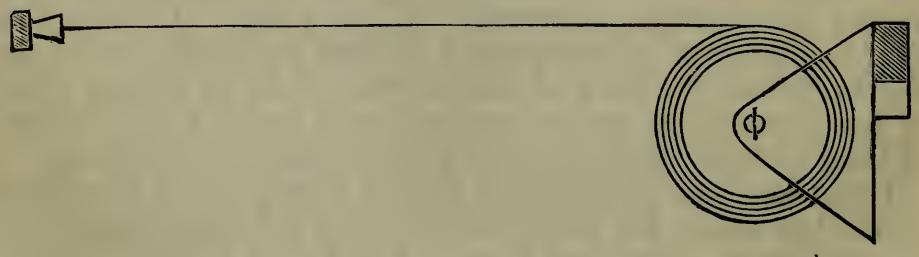
W. B. Dimon.

A NEW DIVISION SCREEN.

I HAVE just fitted a stereoscopic camera with a new division screen, which I feel sure will be a great comfort to those who use one like it in place of the old form with rings.



It consists of a spring roller with a cloth blind, and fixes in the same fashion as the old form of device, roller of course at the front of the camera. The one I have devised gives the



whole range of my bellows, two to ten inches in length, with perfect ease. The cuts will make plain the device.

Horatio Yeates.

TEN PER CENT. SOLUTIONS—A QUERY.

THERE are usually at least two sides to most questions, and although the wheel of fortune brings one side into especial prominence for a while, yet it by no means follows that this is the only side, much less the best side, to have uppermost on all occasions. For some little time past there has been a very wide-spread movement in favor of keeping all solutions for development purposes in what is usually known as ten per cent., *i.e.*, that *ten* minims of the solution contain *one* minim or one grain of the chemical substance. For many purposes this is exceedingly convenient. But for the every-day use of the photographer who is constantly using plates of different sizes, and therefore requiring to mix various quantities of developer in varying proportions according to the size of the plate and the desired results, it may be questioned if this is really the most convenient.

The present writer, after having given a fair trial to the ten per cent. system, has found from experience that this may be replaced by one which he ventures to suggest as simpler, therefore more convenient for actual use in the dark-room.

The method may be designated as the unit system, and each photographer may readily adapt it to meet his own case. The underlying idea is that for a normal exposure on an average subject (*i.e.*, one presenting no special features of contrast or difficulty) the solution should be of such strength that equal parts go to form the developer. To take an instance by way of illustration. Suppose the photographer to be using whole plates, half plates, and quarter plate sizes—first one and then the other. He will probably use most whole plates, the other sizes being used as feelers and for experimental work. Let him then regard his whole plate as his standard or unit in point of size. For this size he will probably use four fluid ounces of developer. For half plates half the quantity, *i.e.*, two ounces, and for quarter plates one ounce.

For development let us assume that he uses pyro, ammonia and potassium bromide. Let him now have his pyro in solution in such strength that *one fluid drachm* contains what his *whole* plate will require, say, 10 grains.

Again, the ammonia is diluted to such an extent that *one fluid drachm* is sufficient for a whole plate, say, 15 minims.

Finally, the bromide is in like way of such strength that *one fluid drachm* again is the normal quantity for the whole plate size, say, $7\frac{1}{2}$ grains.

To develop an ordinary exposure on, say, a whole plate, he takes *one fluid drachm* from *each* of the three bottles—pyro, alkali, restrainer—and fills up to four ounces.

Next plate is quarter size. This requires of course ¼ drachm out of each bottle and quarter the normal quantity of water.

Similarly, a 10 x 8 plate is about one and a half times his unit size, *i.e.*, 1½ drachms out of each bottle and six ounces. While a 12 x 10 is rather more than double.

Two advantages arise from this method:

Firstly, it banishes from the dark-room all mental gymnastics in the way of arithmetic, and having to remember "75 minims out of A and 24 of B." To say nothing of getting mixed as to which bottle is pyro and which bromide.

For ordinary work equal quantities out of the three bottles obliterate that chance of mistake.

Secondly, in such cases where the constituents have to be varied, it is simpler to say to one's self: "Double quantity of bromide—half normal of ammonia" than to have to work out a sum in minims and then eventually get hold of the wrong bottle.

Finally. Have the three bottles of different shapes, so that they may be at once recognized by touch. And two or three turns of string round the neck of the alkali bottle will be found a useful reminder of "go gently."

Rev. F. C. Lambert.

THE BABIES: GOD BLESS 'EM.

It is true that the above expression is not the one sometimes used, but no one who isn't honestly fond of the little folks has any call to go under the skylight. From a financial point of view, the photographer who shows any reluctance to immortalize the featureless features of the rising generation, cuts his own throat. The baby trade makes a good third of the work that the general photographer has to expect, and is the direct key to the other two-thirds. Your success will depend to a certain extent on the quality of your work, but to a greater extent on the quality of your temper. The parents and relatives with rare exceptions are unmitigated nuisances, but you mustn't tell them so. Above all things you must not allow a reputation for crossness to attach to you.

If imperatively necessary you can go it alone, by using baby-holders and such traps, but nothing equals a handy assistant,

who knows just what to do and what not to do. Young babies are very limp and must be skilfully supported. Unless a point is made of it, don't include all the voluminous white drapery. If in short dresses omit the feet if possible. The head is the main thing. Very little can be done in the way of giving positions to babies. They can assume charming positions, but when you try to place them *so*, the result is rarely satisfactory. Don't tell the parents this fact. Try to meet their wishes as nearly as possible. Remember it is their baby and their picture. All the use you have for the mother is for her to stay near the child and keep quiet. Generally it is more difficult to keep her quiet than the baby. A nervous woman will always make the child restless.

For the child's expression you are at the mercy of circumstances. If it is well and of a cheerful disposition, it may smile; otherwise wild horses won't accomplish that desirable end. Avoid the spasmodic grin as well as the startled stare. Note that the head is at the proper level, so that the eyes neither peep out from under the brows nor look down the nose.

All these are small matters, but they must have your attention if you would succeed. Don't hope to keep a baby still. A still child is sick. With quick plates you need only a moment's quiet. As a baby-charmer nothing equals the toy called "Smith's Acrobats." It costs a nickel and is worth its weight in gold. Bells and whistles are good in their place and in moderate doses. Do not be too energetic, especially with good-natured children. Very young babies are easily attracted by burning a small piece of paper. I sometimes use a bright metal disc on a twisted string. When whirled it is very apt to catch the eye. A ball is splendid for larger children.

Groups of children are frequently less troublesome than single ones. You can work on the approbativeness of the larger ones. Have them set a good example to the baby. That puts them on their good behavior. When you can avoid it don't take the parents and a young baby together. The baby will look so small. If unavoidable, suggest three-quarter lengths for the big people so as to give the baby a chance. Don't fail to caution the parents to keep still. It is nearly always their fault if the picture is a failure.

Make a quick exposure and develop carefully. We find pyro the best developer for these negatives. The general use of white drapery favors quick exposures and pyro properly

used does not give chalky whites. When you have the baby in good humor, make at least two negatives. You may not get it so again, and besides it is a decided advantage with children to have as few resittings as possible. Children's health is so very uncertain that it is better to take no risks.

If you can keep your temper, take babies quickly and surely, and at the same time avoid the angles of the parents' disposition, you have a hold on your trade that will not be easily broken.

T. E. Huston.

A PRINTING FRAME TABLE.

To ring in upon the kind reader an old "chestnut" we will make the startling announcement that "necessity is the mother of invention," and that it behooves the knight of the black art to ponder over this if his purse is limited and his desires unlimited and act accordingly. With this preamble we wish to prepare the way for a little invention of our own which we hope will make life worth living to the *tired* photographer and avert his many anathemas.

Every photographer knows how inconvenient and troublesome it is when printing to find a place for the printing frames.

He will, perhaps, place them on the window sill with many misgivings as to their safety; upon the porch floor, an unfavorable position for a tall or obese person; on the lawn where an unlucky blade of grass will cast a shadow upon it. This is very trying to the impatient amateur. But all this is avoided by my wonderful invention.

A one-half inch board of any length as wide as the length of your printing frames is first procured. Then strips an inch square are nailed across the board at equal intervals to prevent warping. On the opposite side a long strip is nailed lengthways near the edge to prevent frames from slipping off.

You next construct a rectangular frame of one inch square strips as long as the distance between the extreme strips on the bottom of board (described above) plus their width, The width of this frame is an inch less than the width of the board. This having been finished, fasten it with hinges to the extreme strips on the bottom of the board, when it will stand out at right angles to the board and enable you to fold it close to the board, thus making it more compact. Two

pieces of strap iron are next procured and bent in the shape of an interrogation point and fastened by means of one screw each to the two corners opposite the one long strip which was nailed lengthways on the top of the board. By substituting leather straps it can be suspended from a window. The one who has read this article closely, and religiously followed directions will then perceive that he has a movable table for his printing-frames, which may be suspended from a window, hung to a fence or to the porch railing.

E. L. Bowlus.

ARTIST VS. PHOTOGRAPHER.

Why is it that almost every "artist," or at least a person who daubs upon canvas for pastime or livelihood, considers it his mission and duty to advise and instruct the photographic guild at large, professional as well as amateur?

Almost every photographic publication of late contains just such effusions, it is art, art, art all the time. The ease with which these "artists" grind out photographic advice is equalled only by their ignorance. In looking over a few magazines at hand I find "art focusing," "art in landscapes," "art in sitting," "artistic shadows," "realistic art," then as if this were not sufficient we have "lines leading into the picture," and another about "Composition in Hand-Camera Work." Then again the long suffering photographer is deluged with long dissertations upon "posing," "lighting," "feeling," "emotion," and atmosphere, etc., while the amateur is even admonished by these so-called "artists" what lenses to buy, "how to focus," and with what finger to "press the button."

In fact it almost seems as if the whole future of photography depended solely and entirely upon the adoption of the freely given instruction, rules and ideas of the artists of to-day.

Now who are these self-constituted wise-acres? Because an individual of this kind daubs upon canvas a nondescript animal in sky blue, with a green tail, yellow nose, pink eyes and purple feet, then catalogues it as a "canine symphony," it certainly does not constitute the object a dog, nor the "artist" a photographic authority, even if he does succeed in imposing the daub upon the uneducated masses as "realistic art."

Strange to say it is just such "artists" as set themselves up to advise photographers at large, though as a matter of fact it

is a question which they know the least about—art or photography. Now in all honesty is it not a truth that the average professional and advanced amateur has nothing whatever to learn from these so-called artists in England and America who inflict their effusions both, literary and mechanical, upon us *ad nauseum.* Go to any of our competitive photographic exhibitions in our larger cities and you will find that in pictorial and pleasing effect, as well as composition, our results far surpass any similar "artist" exhibitions with all the advantages to be derived from color, varnish, heavy gilt frames, shadow-boxes, subdued light and other accessories incident to an art gallery.

In professional portraiture, wherever skill and judgment prevails, our art science is so far ahead of the average oil portrait that the latter is completely out of sight. Not alone in the fidelity to nature but in the pose and lighting as well. Yet these same "artists" while they ridicule everything photographic, calling them machine-made goods, etc., set themselves up to criticise, advise, direct and lay down sets of rules for the photographer.

Why this state of affairs is tolerated by the photographic press has always been an enigma. The average artist, whether he paints window-shades, landscapes, marines, still-life, saloon signs or works up crayon enlargements, or is perhaps ambitious enough to attempt portraits, can learn much from photography, and if the truth be known the great majority of "artists" use the camera on the sly for all there is in it, by making up their compositions from their prints, and then palming them off on an unsuspecting public as original emanations of an inborn talent or genius.

That the intelligent camerist, be he professional or amateur, has nothing to learn from the average "pot-boiler" artist of to-day is a fact which will be apparent to any one who visits both the photographic as well as the so-called annual art exhibitions.

Another thing to be taken into consideration, a real artist whose talent or proficiency is great enough to insure him advance commissions has no time to "advise" photographers, to the contrary, if one's talent in drawing and execution is so meagre that he is dependent upon "buck-eyes" and "pot boilers," his advice, criticism or instructions upon the art side of photography is certainly not worth the consideration of any intelligent photographer.

The worst feature of this deluge of photographic literature

from "artists" is the absolutely misleading nature of most of this so-called advice, independent of the impractible theories with which they abound, and the false rules laid down in the "instructions."

Photography will get along all right if let alone. There are at the present day to be found in the ranks of our guild men who are second to none for intelligence, artistic talent and scientific training. No intelligent photographer need give any odds to the "pot-boiler." The shoe is upon the other foot, and the sooner this fact is acknowledged the better it will be.

It was Stephen Girard who once advised an "artist" portrait painter that if he was determined to make a living out of his paint brush he better shift to broader work, viz.: house-painting. The adoption of this advice would no doubt prove beneficial to many of the "artists" of to-day, especially such whose only mission seems to be to rush into print on photographic subjects.

In conclusion, the writer would say to the photographic press at large, give us more about photography pure and simple, and less about art.

Julius F. Sachse.

NOTHING NEW.

The subject of development would seem to be threadbare. Possibly it is. Yet, with the amateur lacking skill and experience, it is the rock upon which he most often strikes, and as a consequence the one where his greatest losses follow. The evolution of the camera has given us an instrument of the "push-the-button" order, which from its character has forced the exposure part of photography out of the bounds of consideration.

The peripatetic amateur takes a shot at everything. Strong light and weak light all seem one to him; an old mill in heavy shadow or a cow in broad sunlight are treated alike, the button pushed, and the joyous exclamation is heard, "I've got it!"

Next, the development; next, the blame for unsatisfactory work—this is heaped in liberal quantity on the stock-dealer and the plate-maker; some one must be blamed, and the rule is to blame anybody but himself.

Very many years since a well-known photographer was asked for his formula for collodion. Many thought he had compounded a solution far better than any known to others.

He wrote it for the editor of the journal in my presence. It was published, and contained the one ingredient not in common use; this was to be added last, it was, "Brains, quantum sufficit"; this is the lacking ingredient in most amateurs' work.

Let the would-be photographer think for a moment and answer, whether he thinks an intelligent physician would treat all the conditions resulting from a bad cold, alike; or whether he thinks that he would treat all fevers resulting from various causes alike. If he answers no, then let him propose to himself this question: "Why should I give all subjects the same exposure, why should I treat all plates of all subjects alike in my timing and development of them?" When he has reached the conclusion, that different conditions require different treatment, he will have made one advance, without which he never can produce good work.

Not long since a lady whom I had instructed in our art called to see me, stating that recently she had had very bad luck; producing the negatives I discovered that with her "push-the-button" camera she had made an effort to obtain interior views of her home with the same exposure that she had given to landscapes in and about it; these may be simple things to write about, nevertheless they occur daily.

As an illustration of the difference required in exposure, the same plate, lens and diaphragm being used, an extreme one, perhaps, but it serves my purpose to illustrate how important is the ingredient of "Brains, q. s."

I exposed a plate on the hallway of my house, time, forty-five minutes, immediately thereafter one on the house, time, as much as was required to slowly remove and replace cap of lens, probably a second and one-half, both excellent.

Did I develop them alike. No.

The one of the house was developed with normal developer, having fifty per cent. more water added than I would have used in December, when the water is in temperature about 40 deg. (it is now over 70 deg.); plates and all else are heated as well.

The hallway was developed with same normal developer, with one hundred per cent. of water added; it came up slowly. When all details were out, finding negative weak, I poured off the developer then on, and flowed plate with normal developer (no water); intensity soon followed.

This matter of difference in temperature is not as well understood as it should be. Heat hastens chemical action;

that which answers about Christmas does not meet the wants of the Fourth of July, at least so far as photography is concerned.

My only apology for not presenting *new* ideas is that I feel confident that some of the *old* ones are not as well understood as they should be; they are essentials in the *new* as well.

Chas. Wager Hull.

THE POWER OF EIKONOGEN.

Now and then a new developing agent is discovered, and its properties are lauded so lavishly that one is made to believe it will supersede at once all the developers in use. Ferrous oxalate has had its day, although it is still used to some extent in Germany. Pyrogallol was also excellent as far as its developing powers went, but it tanned both hands and plates a trifle too much. Hydrochinon was hailed by amateurs because it did not stain so much, and paramidophenol will have to be greatly improved before anybody will acknowledge it easy to handle. Eikonogen is beyond question the best of all, provided one has a good formula. It keeps in solution for months without growing darker (in an amber-colored bottle), and it can be manipulated as exactly as if it were a mechanical contrivance. The formula which the writer uses is simple, can be used on any brand of plates with perfect success, and, for lantern-slides is just as good if a little bromide be added.

Eikonogen	1 ounce
Sodium sulphite crystals	4 ounces
or granular	2½ ounces
Potassium Carb	1 ounce
Water	64 ounces

For ordinary exposures this can be diluted one-half with water and for extremely rapid exposures it should be used almost full strength, or full strength if necessary. If the image comes up weak, the stock solution can be added in any quantity and the negative will gain rapidly in crispness, and if the plate be over-timed bromide should be used as with any developer.

The most remarkable quality of this developer is that it does not stain the plates and the negative can be lifted directly out of the developer, drained and put right into the hypo. It is assumed that everybody uses acid sulphite of soda in the fixing bath, and no matter how skeptically some may take this state-

ment, still it is a positive fact that no harm will result to the plate if it be not washed until after it is fixed.

Eikonogen is destined to hold its place until a far superior developing agent is discovered. No photographer who uses it will discard it for something just as good, and if any new developer is to be placed on the market it will have to have a number of advantages over eikonogen to have any sale at all.

Maximilian Toch.

METHOD OF TAKING A STEREOSCOPIC VIEW SO AS TO PRINT DIRECTLY FROM THE PLATE, WITHOUT CUTTING.

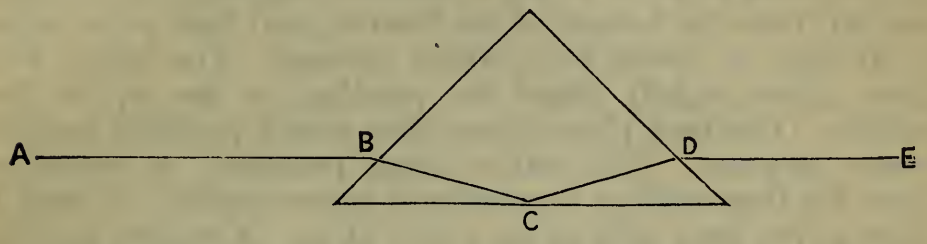
All who have used a stereoscopic camera, and probably most photographers who have not are well aware that in order to produce the stereoscopic effect in the print, it is necessary to invert the position of the two images as they are printed from the plate, the reason being simply that as the images are inverted, the one produced by the right-hand lens comes on the left-hand side of the plate, when the latter is put top-side up. This involves cutting and mounting the pictures rather accurately, which takes some time and trouble. If then a method can be devised, which will not be too complicated, or require too much outlay, of constructing the camera so as to perform this reversal itself, it would seem to be an improvement.

The only possible way appears to be by means of reflection. And there must be two reflections, unless we are to use a film and print from the wrong side of it. This idea of using a film, and having only one reflection, seems at first promising; but examination, if we are not mistaken, will show that any way otherwise satisfactory, such as putting a mirror inside or outside the camera, parallel to the line connecting the lenses, and inclined at an angle up or down, will give the same inconvenience as to relative position of the images—that is what we wish to remedy.

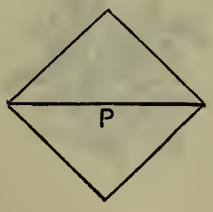
Other constructions may no doubt be suggested, but for anything like a practical arrangement giving two pictures taken from points properly placed, I have found no solution to the problem, either for a film or plate, except by the use of a mirror which while sending the centre of the image in its natural or unaltered line, reverses the sides of it. Such a

mirror we have in a rectangular prism, placed thus with regard to the central ray of the image.

A B here represents this central ray coming from the object; it is refracted at *B*, reflected at *C*, and refracted again at *D*, pursuing its course on the original line *D E*, a continuation of *A B*. The color produced by one refraction is corrected by the other.



Theoretically this construction labors under some disadvantages, it is true. The principal one is, perhaps, that the illumination is somewhat unequal. It is theoretically possible to take in an angle of 90 deg. with it; but the rays at the sides lose much effect, by not being received favorably by the lens (outside of which the prism must be put, of course); and those coming from the lower side in the diagram will at the angle of 45 deg. be simply tangent to the surface at *B* and at angles near it will enter in much less abundance than those at the centre. However, I have found by actual trial with a Morrison $4\frac{1}{4}$ x $6\frac{1}{2}$ lens (No. 3) of $4\frac{1}{4}$ inches focus, that it was possible by properly adjusting the prism, which measured about $1\frac{1}{3}$ inches square on each of its refracting faces, to make a good reversed fairly well lighted and properly centred picture,



covering about 37 deg., or 3 inches square on the plate, which is about large enough for our purpose. With a longer-focused lens, of course, the result would have been still better.

Perhaps a better effect might be produced by using a double prism, thus making together a cubic block, separating the two parts by a piece of black paper, *P*. This seems theoretically to have a decided advantage, if the stop is not too small.

I have not as yet been able to fully try it practically with a pair of equal prisms.

The prisms need not, as it would seem, be very expensive, as neither the material nor the surfaces would have to be as good as when they are used, as they commonly are, in connection with telescopes, and with high magnifying powers.

The images once being reversed laterally, the rest is easy. All we have to do is to put a reflector diagonally in the camera, say, from the bottom of the front up and back at an angle of 45 deg., to obtain the vertical reversal. The image will then appear, rightly placed for printing, on the top of the camera. Ordinary plate mirror glass would probably answer every purpose. The double image produced by reflection from the front surface is practically imperceptible; at least I have never been able to see a sign of it. A septum to fully separate the two pictures will, of course, be employed, as usual.

Of course, if a film was used as suggested, the vertical reversal would be unnecessary.

G. M. Searle.





Edward H. Graves, Photo. Electro-Light Engraving Co.

MY JACK.

THE PICTURES.

In our introductory remarks to the description of the pictures which embellished the previous volume of The American Annual of Photography, we extended an invitation to all readers of the book to participate in the friendly competition for place in the volume of 1893—The World's Fair Year. The hope was expressed that this volume should be an even greater success in its illustrations than its predecessors, though they were received with every mark of gratifying appreciation by our readers. It is therefore with especial satisfaction that we call attention to the full-page illustrations which embellish this volume of The American Annual of Photography. As heretofore the pictures have been selected from a very large number of photographs submitted, and the aim has been to represent the widest possible field of photographic work, both in the character of the pictures themselves, and in the method of reproduction. Taken as a whole, we think they may fairly be considered an adequate representation of the present state of photography. And that is, of course, all that can be hoped for or expected. Now for 1894!

"Focusing."

The frontispiece this year, as heretofore, is a photogravure. It is from a negative by Miss Emily V. Clarkson, a well-known and highly skilled lady amateur photographer. Miss Clarkson has exhibited a great many photographs of the highest order of technical and artistic merit, both in exhibitions and in photographic periodicals; but no one, we venture to say, of a higher order than the illustration which serves as frontispiece to this volume.

The picture requires no word of explanation; it tells its own story remarkably well. The Wedding Bells, which the engraver has added as his marginal *remarque*, are an appropriate suggestion of the sequel to this picture. The photogravure reproduction was made by the New York Photogravure Company, by its highest grade copper-plate engraving process, and is fully up to the standard of artistic excellence maintained by this well-known company.

"Good Morning."

Our next illustration is a phototype by F. Gutekunst, of Philadelphia, from a most artistic negative by G. Watmough Webster, the distinguished professional portraitist of Chester, England. Mr. Webster makes a specialty of child pictures, endeavoring always to secure a picture, as well as a faithful likeness, in his photographing of the little people. His "Good Morning" is a favorite subject, and we think fully justifies his high reputation.

"In Ye Olden Time."

This is a characteristic figure composition by Mrs. James Osborn Wright, a graduate of the Chautauqua School of Photography. The picture peculiarly well justifies its title, having been most carefully arranged by Mrs. Wright to faithfully represent "Ye Olden Time." The reproduction is by the Albertype Company, of New York, by their well-known and highly artistic process.

Our Aristotype Illustration.

This beautiful portrait study, by Sarony, has been printed by Messrs. Bradfisch & Pierce, on their "Perfected" Aristotype Paper. We call the attention of our readers to the effective posing and lighting, which is worth the study of even our most skilful portraitists. Mr. Sarony has long been acknowledged a master in his art.

The aristotypes were printed in accordance with the printed directions issued by Messrs. Bradfisch & Pierce. The print is made about two shades darker than desired when finished. It is then washed for about an hour in cold water, until the bath remains clear. The toning may be done in any good bath, as used for albumen paper, until the desired shade is obtained, though the Bradfisch "Perfected" toning and fixing solution is recommended by the manufacturers. When the proper tone is obtained, the prints are placed in fresh water until all are toned, and then are transferred to a hardening bath, made as follows:

Water	1 ounce
Saturated solution of alum	2 ounces
Saturated solution bicarbonate of soda	1 drachm

Allow the prints to remain in this bath for about five minutes, using sufficient solution to entirely cover the prints.

Then wash the print for fully ten minutes, and fix in a plain hypo bath for fifteen minutes. The prints should then be washed for from one to two hours in running water, or still water that can be occasionally changed. The prints are mounted the same as albumen prints, and, when thoroughly dry, may be lubricated with castile soap and alcohol, and burnished.

Though the Bradfisch Aristotype Paper is a comparatively late comer, it has quickly sprung into the foremost rank of popularity, and is universally giving entire satisfaction.

"The Chase."

This is a reproduction by Mr. Kurtz' "New Process" from a photograph of a celebrated painting in oil, by the eminent French artist, L. Melin. The original painting was sold in this country for $20,000.

The Daguerre Portraits.

These new portraits of Daguerre, illustrating an highly interesting article by Mr. Canfield, are fully described in that article. They were all reproduced by the Kurtz-Meisenbach process. The three illustrations to Mr. Eickenmeyer's article are also spoken of in the article which they accompany.

"The Great Earthquake in Japan."

These pictures are likewise fully described in the article which they accompany. The negatives were made by Prof. Burton, who writes the article, one of the plates being reproduced by Capt. A. J. Russell, of New York, and the other by W. Kurtz.

"Paradise Falls."

This is a characteristic Western scene by John L. Tait, engraved by W. Kurtz. Mr. Tait writes as follows in regard to the subject of his picture:

"Closely nestling around the base of Mount Tacoma are numerous valleys, some small, others swelling to a magnitude; but by comparison with the ever-present vastness of the mountain towering above them are changed to commonplaceness.

"These valleys, the interval between the perpetual snows above and the warmer, but not more beautiful lowlands beneath, are blessed with an admixture of the two kingdoms which make them in truth what one of them is called—'Paradise Valley.'

"Paradise Valley proper lies south of Mount Tacoma, and is about five miles in length by four in width, north and northeast.

"Stretching up into the clouds far above the valley stands the noble 'snow pile' almost 15,000 feet in height, and on the south and southwest extends the different but equally beautiful serrated ridge of the Yatoosh Mountains, a favorite haunt of the mountain goat; while away to the east stretching far beyond the range of the keenest vision, lies the ragged field of the Cascade range of the Rockies, finally to be absorbed in the mother system.

"Travellers coming from the West, as do most of those few whose perseverance and love of the beautiful carries them thus far over natural obstacles, journey for two or three days under tall sombre firs, or over thick, velvety mosses, sometimes winding along the side of a fast-rushing stream or following the pack cayuses as they carefully pick their way along the edge of an almost perpendicular bluff; and, at first looking with trepidation at the tops of giant firs and cedars only a few feet distant, make their first camping place before reaching the valley either at the 'Ford of the Nisqually' or at the Mineral Springs, some five miles distant.

"Rising early in the morning horses and men essay the passage of this stream which here has a fall of 500 feet to the mile. Just above and to the left as you cross toward the valley can be seen the glacier from which the stream takes its rise, and, on a clear morning, the mountain can also be observed so nearly above the traveller as to make him look up and still up before he realizes its immensity.

"The traveller must ford the stream in the very early morning so as to catch it at its lowest, before the morning sun has had an opportunity to set free the greater volume from its prison, in the ice caverns of the glaciers.

"After crossing the ford we patiently ascend one of the steepest bluffs we have yet struck and creep along under trees becoming gradually smaller until we finally reach the top, and making a sharp turn to the right suddenly emerge from the forest and halt spellbound by the beauty of the scene. All around us and covering the entire beauty spot are flowers of

almost every hue, from the most brilliant red to the purest, daintiest pink and white, and from the deepest purple to light-blue, while the valley itself reaches away from the spectator of this 'Nature's Panorama' in vast billows of flowery slopes and uplands interspersed with clumps of trees and flowering shrubs until it rushes up to and rolls against the feet of the majestic emperor himself—stern old beautiful, snow-clad Mount Tacoma.

"How bountiful is nature and how lavishly has she displayed her beauties on this spot of the earth! What a feast there is here for the photographer who will give himself up to her guidance.

"Intersecting the valley are almost innumerable streamlets of the purest, coldest ice-water, and the long grass affords excellent and abundant fodder for horses; while, on the higher slopes, may be found some of the finest specimens of heather, to make glad the heart of the Scotchman.

"Far up at the northeastern corner of the valley, and just at the base of the mountain, a stream, at first clear, but soon colored by the grinding lava and scoria over which it passes, issues from the side of the Cowlitz Glacier, and gaining speed with its rapid descent bounds onward, sputtering, dashing and twisting, till after turning to the right throwing itself over the edge of the bluff and rushing down the narrow gorge beyond, it gains the comparative quiet of the valley itself.

"Just where it falls over the bluff and dashes roaring down the rock-covered descent toward its home below, it has been called 'Paradise Falls,' and but a faint idea of its beauty is given in the illustration."

"My Jack."

The excellent horse portrait by Mr. Edward H. Graves, a member of the New York Camera Club, was exhibited with the highest honors, at a late exhibition of the camera club of which Mr. Graves is a prominent member. The reproduction was made by the Electro-Light Engraving Co.

"Brahmas."

This is another picture by a well-known member of the New York Camera Club, Mr. S. W. Bridgham. It is a highly successful picture of a most difficult subject. Mr. Bridgham tells us he tried many times before he succeeded in obtaining

just the picture he desired. If the conditions of light were all right to expose, the fowls would change their positions so that his grouping was spoiled, and when the grouping was all right and properly placed in his picture, other things would be wrong, so that he could not make the exposure. At last he succeeded, as all who see this picture will attest. The reproduction was made by the Electro-Tint Engraving Co., of Philadelphia.

"Preparing for School."

Another picture by a Chautauqua student, Miss Mary S. Turner; and this one, also, is a faithful representation of a characteristic incident of American home life. It is unpretentious in attempt, and thoroughly satisfactory in accomplishment. The Photochrome Engraving Company reproduced the negative.

"Teacher and Pupil."

This attractive and difficult figure picture, combining, as it does, the portrait of a little child, and a dog, was made by Strauss, the eminent professional photographer of St. Louis. It is a success in every particular, and justifies the high reputation of Mr. Strauss for making successful pictures of difficult subjects. The reproduction is by the Crosscup & West Engraving Co., of Philadelphia.

"The Noon-Day Hour."

This characteristic American landscape is by Mr. W. C. Walker, a well-known photographer. The half-tone plate was made by the New York Engraving and Printing Co. Mr. Walker writes as follows concerning his picture:

"A view on a small stream in the Mohawk valley, near Utica, N. Y., taken one July day in 1891, at noon, an hour not usually chosen by photographers to make outdoor views.

"This photograph was taken with a Voightlander lens, on a Carbutt Orthochromatic plate of 23 sens., and taken under some difficulties. With heavy shadows in the foreground, a cow that was restless under the summer heat, and the distant meadow flooded in sunshine, in sharp contrast to the foreground with its foliage, and reflections from the water, all united to



Mr. S. W. Burnham, Photo., Lick Observatory.

Wm. Kurtz, Engraver.

MOUNT HAMILTON.

make it a difficult matter to judge what exposure would give the best results. With a stop of medium size, an exposure of three seconds was given, without the color-screen. No color-screen could be used in this case, as the ruminating cow would not allow of a long exposure. The plate was developed with pyro and soda in a tentative way, and is a fair example of orthochromatic work without the use of the color-screen.

"For landscape and outdoor work in general, I have found that orthochromatic plates either with or without color-screen give the most satisfactory results. The rendering of the color values and the middle and half-tones not depending entirely upon the use of a color-screen, for that is often dispensed with, particularly if the light is of that golden yellow radiance of a midsummer afternoon. This light softens the greens in the foliage and the blue rays of the sky, and we have a color-screen of nature's own contriving, an orthochromatic screen ready for our use."

"Three of a Kind."

One of the two illustrations contributed by Mr. D. F. Fairchild, a successful amateur photographer of Leavenworth, Kansas; and both are successes. The picture tells its own story. The three are certainly of a kind. Mr. Fairchild is one of the three, so we have a conundrum as well as a picture. Stevens & Morris, of New York, were the engravers.

"A Catskiller."

This is the second picture by the author of the above, Mr. D. F. Fairchild, and is similar to it in character and treatment. It is also reproduced by Messrs. Stevens & Morris.

"A Sun Picture."

This effective illustration was made by Mr. A. H. Philips. It might have been called a moonlight scene, as so many photographs made in the same way of the sun, are entitled, but it is called just what it is, a sun picture. The plate was reproduced by W. H. Bartholomew, of New York. Mr. Philips writes: "I made the exposure from the deck of an in-

coming steamer. What appears to be a dark cloud is smoke from the steamer blowing across the sun. The negative is on Seed's No. 26 plate, developed with pyro; no retouching. My camera is a Scovill Detective."

"Hawarden Castle."

The country seat of the Hon. W. E. Gladstone, once more England's Premier, was photographed by Mr. Rupert Stearn, a successful English professional photographer. The reproduction was made by Mr. David Anderson, of New York. Mr. Stearn writes as follows in regard to his picture:

"After several years' work at portraiture and the last three in a studio in smoky London, I felt I would prefer the sweet country air, so I accepted an engagement to travel as landscape operator for a publishing firm, and bidding adieu to the whims and fads of the general public, which poor photographers have to submit to in a studio, I started on a tour to take a series of views of our 'Cathedral Cities' and places of interest around same; but alas! I found I had more to contend with than in the studio, by lack of sunshine, boisterous winds and frequently a hazy atmosphere. Therefore patience and perseverance are essential to landscape operators.

"During my stay in Chester last year, I wrote for permission, which was kindly granted me, to take a series of views of Hawarden Castle, six miles from that city (Chester). I had to go to Hawarden many times before the weather was suitable enough for me to make my exposure; however, I eventually succeeded on a beautiful September morning, and as I stood with my camera in Mr. Gladstone's flower garden, I felt almost as though the ground whereon I was standing was 'holy ground.' There were many spectators in the park, looking at me with envious eyes, especially those who were carrying cameras, at seeing me the other side of the railings, which separate the park from Mr. Gladstone's private gardens, and I feeling like a hero of the day.

"The photograph was taken on an isochromatic plate. To admirers of England's greatest living statesman, the Right Hon. W. E. Gladstone, a few details concerning the castle may be interesting. (I quote from the Hawarden visitors' hand-book.)

"Hawarden Castle is very historical. The old castle ruins, which still remain, is, according to the best authorities, the work of one period, and that, probably, the close of the reign of Henry III., or the early part of Edward I. But the photograph is of the modern castle, situated in a most beautiful natural park of about 250 acres in extent, its banks and glades richly timbered and overgrown with bracken afford, from various points, most lovely views over the plains of Chester. The castle was built in 1752, originally a brick house; it was afterwards, in 1809, extended by the addition of the library on the west side and of the kitchen and other offices on the east, the whole being cased in stone and castellated. The steps on the shadow side in the photograph lead up to Mr. Gladstone's study, or, as he calls it 'The Temple of Peace.' The most striking feature about this room is that it is built about with bookcases, and, instead of their being ranged along the wall, they stand out in the room at right angles, each to hold a double row facing either way. Intervals are left sufficient to give access to the books, and Mr. Gladstone prides himself upon the economy of space obtained by this arrangement. His library numbers nearly 20,000 volumes, many of which have overflowed into adjoining rooms where they are similarly stored."

"Ruins of Velton Abbey."

This is another typical English scene, also made by a well-known English photographer, Mr. Thomas Mansell. Mr. Mansell's negative was reproduced by the Photochrome Engraving Company of New York.

"Mount Hamilton."

Much has been heard of late concerning the great Lick telescope at Mount Hamilton, Cal., and several photographs have been reproduced which were made about the mountain, but no picture of the mountain itself. Our illustration, from a negative by Mr. S. W. Burnham, formerly in charge of the Observatory, shows the observatory in the distance in its isolation above the clouds. The reproduction is by W. Kurtz, of New York.

"A Portrait Study."

The figure photograph of Mr. Oscar Suck, of Carlsruhe, is an excellent example of this German professional's portraiture. Both the posing and the lighting are excellent, and together make a worthy model for the study of American portraitists. The engraving was made by the Gill Photo Engraving Company, of New York.

"Artillery Practice."

This instantaneous picture of a foreign subject is also made by a foreign photographer, Lieut. Carl Hiller. It represents a characteristic scene in the field practice of the German army. Mr. Kurtz made the photo-engraving.

A RECORD OF PHOTOGRAPHIC PROGRESS.

Introductory.—As previous issues of The American Annual of Photography and Photographic Times Almanac were, so the present volume is, in itself, the most complete record of photographic progress during the year; and, in order to gain an adequate knowledge of all that has been accomplished, one should therefore carefully peruse all the preceding pages of this book. These pages contain, among other valuable information, the ripe experience of the most eminent authorities in the two hemispheres; the most approved formulas in the various departments of photographic work; numerous tables of photographic information revised by the most successful workers and brought up to date with many additions of importance; many full-page pictures by eminent professionals and amateurs, reproduced by the various photographic and photo-mechanical printing processes; and lists of books on photographic subjects published during the year; photographic patents issued by the U. S. Patent Office; American and foreign photographic societies; new laws affecting photography; and a carefully corrected calendar and almanac for the new year.

An International Photographic Exchange.—We are glad to announce the organization of "A World-Wide League," which a contributor in far-off Finland, Mr, Charles Hamfeldt, suggested in the volume for 1892. Such an international photographic exchange has actually commenced

operations with agents in many countries and an encouraging prospect of an ultimate widespread success. The particulars of the interchange are fully set forth by Mr. Hamfeldt in the July 15th issue of *The Photographic Times*, to which we direct the attention of all who may be interested in the subject.

Photographic Objectives.—In the manufacture of photographic objectives there are many improvements to record. The Jena-glass in its many modifications, and especially in that with barium flint and crown, in combination with ordinary flint and crown glass has conduced to the construction of photographic lenses distinguished by perfect aplanatism, correct drawing, more than usual luminous power together with a great angle of vision. The "Paragon," by Swift; the Steinheil aplanate and antiplanet, and the Zeiss Anastigmat, are now made in this glass.

The ingeniously constructed tele-photographic objective of Dr. Miethe, when only of from 30 to 50 cm. in focal length, it capable of projecting pictnres equal in size of diameter to shose made by ordinary lenses of from 2 to 4 metres focal length. The combination consists of a collecting lens producing the image proportionately modified by a dispersing lens.

Photographic Apparatus.—In the manufacture of photographic apparatus there is not much to report that is decidedly new. The multiplication of hand cameras goes on; but most of them are modifications of the older forms of cameras. The Henry Clay camera described in the 1892 volume of The American Annual of Photography, and again spoken of by Prof. W. Jerome Harrison, in the present volume, has been improved, and is, perhaps, all things considered, the best "all-round" camera, as Prof. Harrison styles it.

Prof. W. H. Bristol, of Stevens Institute, has designed a very ingenious magazine camera for carrying twenty-four $3\frac{1}{4} \times 4\frac{1}{4}$ square films. This camera is simplicity itself in operation, involving one or two entirely new principles in the construction of photographic cameras. The tendency has seemed to be toward extremely cheap cameras, the "Rattler," a new hand camera, making 4 x 5 square pictures, being sold for only $5.

Several novelties have been introduced in photographic accessories for the professional studio—one, an artistic wall and bench combination, is capable of making eight different combinations. Other useful accessories for professional pho-

tographers' work, such as background holders, burnishers, flashing lamps, dark-room lamps, etc., have been introduced. But these are things which may be found fully described in the various catalogues of photographic merchants and manufacturers.

Gelatine Emulsions.—Gelatine emulsion continues to be the carrier for sensitive surfaces on glass and films for field and studio work. The strenuous efforts made in certain quarters to revive the wet-collodion method has not met with success. Gelatine emulsions have been improved in various ways, and are manufactured with greater sensitiveness than ever before.

To prevent green and red fog Henderson avoids direct contact of the silver nitrate with gelatine by precipitating it first with ammonium carbonate and incorporating the well-washed silver carbonate with the melted gelatine; then by adding an appropriate alkaline bromide, the silver is transformed into bromide of silver. We mention this method as an example of the various attempts made to perfect emulsion making,

Orthochromatic Photography.—The orthochromatic or color-sensitive plate has been extensively adopted for all kinds of work by professionals and by amateurs. The effects produced by them are justly considered more truthful to the original subject and the decided merit of these plates is being more and more recognized by the public. Investigations in this interesting branch are still going on. Chlorcyanine has been found to be a superior red sensitizer to the iodine cyanine, and the same has been said of Alizarin and Coerulin when combined with bisulphites.

Developers.—Although there are many photographers, both professional and amateur, who retain the older developers such as ferrous oxalate and pyrogallol, the development of dry-plates has been almost revolutionized by the introduction of certain organic compounds of more or less energy as developers. Para-amidophenol, either in its base or its hydrochlorate form, possesses so many advantages that it has sprung into a widespread popularity during the past year.

Several other developers have been introduced to which still more surprising properties are ascribed than those which we have tried. Methol and glycin, both being substances very soluble in water are capable of forming highly concentrated developing solutions of great energy; still newer is the amidol, whose most forcible action upon emulsion plates is

when in acid form. Notwithstanding the excellent quality of these various new developers we can not report that pyrogallol has been driven from the market; it is still very largely used, especially by the profession.

Printing Processes.—Though the various aristotype papers have increased in popularity throughout the country during the last year, albumen paper is still largely used. There is a certain charm about a good albumen print which is rarely obtained on any other paper. The greater simplicity of working the aristotype paper method commends it to a large number of photographers. Aristotype paper has been much improved during the year, and therefore justifies its increasing popularity. There would be more certainty about its keeping qualities, however, were all emulsion prints toned and fixed in separate solutions. Being in most cases subjected to the action of combined baths their permanency is doubted by many on account of the conversion of the silver deposit into sulphide of silver.

Bromide printing, except for enlarging, does not seem so popular as some time ago. Enlargements on bromide paper, however, have been very successfully toned to warmer colors by means of uranium nitrate, and large editions are printed on bromide paper by automatic machines.

The platinum process continues to be in favor with many professional photographers of the higher class. Since the cold process was introduced it has gained in popularity among amateurs.

Kallitypy has made rapid progress since the silver nitrate formerly acting as a developer has been incorporated with the sensitive solution.

Excellent matt-surface papers are being turned out by the various makers of aristotype papers. This paper rivals platinotype in beauty of effect.

Porcelain printing is once more coming to the front. It is made very simple by the "luxotype" opals, which have recently been introduced, being ready-sensitized for printing-out, toning and fixing, similar to aristotype prints. Transparencies and lantern-slides may be made without development. "Luxotypes" are sure to be popular.

Photo-Mechanical Printing Methods.—The various mechanical printing processes are constantly engaging more attention, and are being more widely used than ever before for book and magazine illustration. Instead of the zinc plate

formerly used, copper and occasionally brass is preferred on account of the better printing qualities and durability of the cliché. Asphaltum is chosen by many in preference to the bichromatized albumen or gelatine, because of finer detail produced by it; and its sensitiveness has been very much increased by sulphurizing the fossil resin.

Meisenbach's method of turning the line-screen during exposure is but little practised at the present time. With cross-lined tint and single exposure, most beautiful results are now obtained. Great improvements have been made in the production of these screens, and there are none better than those made by Americans. Photogravures from intaglio copper-plates are not made in such enormous numbers as the various kinds of phototypes; but in beauty they rival any of those turned out by European establishments.

Heliochromic Printing is rapidly approaching a never-dreamed-of perfection. The old and original processes of Ducos du Hauron and Joseph Albert have been materially improved, and suggestions more recently made appear to be the harbinger of a new era in these important processes.

Instead of one, several optical sensitizers are now being used for the reproduction, one for each of the fundamental colors, and if practical, the sensitizer constitutes the pigment for printing, or one having as near as possible the same or similar spectroscopic properties. The method has become practical, and, although there are yet many improvements to be made before absolute perfection can be recorded, several American photographers have made extremely fine heliochromic pictures printed upon the lithographic and the type press from three negatives and in three colors. Ives, employing the same principles, projects lantern-slides in three colors simultaneously and produces natural color effects of the greatest beauty.

The Chromoscope.—In Mr. Ives' chromoscope something entirely new has been given to the world. In this ingenious instrument, by means of his perfected composite heliochromatic methods Mr. Ives shows photographic results in the original colors of nature. Mr. Ives' composite heliochromy was fully described in *The Photographic Times* for February 19th. The chromoscope is described by Mr. Lincoln Adams in this volume of The Annual.

In Photography by Artificial Light, the electric arc is still retained for the reproduction of artistic and commercial subjects. For natural objects, however, the magnesium flash

and continuous light is now almost universally used. Ingeniously constructed lamps have much increased the employment of artificial light, and the addition of aluminium to the magnesium may be considered as an improvement.

In Photo-Micrography and in the making of lantern-slides, the wet-plate has been entirely abandoned, owing to the great superiority of the gelatine emulsion plates manufactured especially for that purpose. In medical investigations, and in astronomy, in meteorology, and in all the other scientific applications, the sensitive plate has become a most valuable and important assistant.

Societies for the cultivation of photography are springing up everywhere. Photography's value as an aid to educational pursuits is now better understood than ever before. It is employed to illustrate the object lessons in kindergartens, high schools, and even universities. The practice of celestial and spectrum photography continues. Photogrammetry has become the valuable assistant to the surveyor, and is now taught in our national military and naval institutions.

Artistic Taste.—Praiseworthy are the indefatigable efforts of professionals to introduce artistic effects into their productions. A higher class of artistic work has been shown in amateur exhibitions.

Books and Schools.—The increase in artistic taste shown is undoubtedly due to the greater amount of reading which photographers now do than formerly. Various schools of instruction are also highly useful in improving the quality of photographic work. The phenomenal growth of the Chautauqua School of Photography is evidence that such institutions have long been desired. Similar schools have been organized in various parts of the country, but none have had such a wonderful growth as the Chautauqua School.

Necrology.—At the close of another year we record with sorrow the names of those who have been removed by death.

Among those who have rendered the very greatest services to photography was Lewis Morris Rutherfurd, the eminent scientist, who was taken away in the early summer of the present year. John Calvin Moss, founder of the Moss Engraving Company, is another who has given a life of successful service to photography. Doctor Theodor Schuchardt, the photographic chemist, of Görlitz, Germany, died early in the spring. General M. C. Meiggs, of the U. S. Army, always a patron and a

helper of photography, went to his rest on the first day of the year. George Francis Schrieber, who for fifty years was a prominent photographer in Philadelphia, and for many years was well known throughout the entire country, died January 3d. Our own contributor, W. H. Metcalf, who wrote an article in last year's volume which has elicited perhaps more interested correspondence than any other one article in the book, died in his home, in Milwaukee, early in the year. Willard H. Fuller who, also, was actively interested in the preparation of the preceding volume of THE AMERICAN ANNUAL OF PHOTOGRAPHY, and, indeed, of all its issues from the initial volume, was suddenly taken away, and James V. Escott and George Heyn, both well-known photographic merchants, complete the sad list. Full accounts of all these men were given in the columns of *The Photographic Times* at the time of their decease.





Mrs. James Osborne Wright, Photo. The Albertype Co., N. Y.

In Ye Olden Time.

STANDARD FORMULAS

AND

USEFUL RECIPES.

PRELIMINARY NOTES.

1. Unless otherwise directed, solids are to be weighed, and liquids to be measured.

2. Unless specially directed otherwise, the *ounce* in the case of solids is understood to be the Troy ounce (= 8 drachms, or = 480 grains). And in the case of liquids, the ounce is understood to be the fluid-ounce, U. S. measure (1 gallon = 8 pints; 1 pint = 16 fl. oz.; 1 fl. oz. = 480 minims).

3. When Acetic Acid is mentioned, that of 36 per cent. strength, spec. gr. 1.048 (U. S. Ph.), is understood.

4. Glacial Acetic Acid is intended to be an acid containing about 85 per cent. of the absolute acid.

5. In accordance with the custom now more and more coming into use, the chemical names of salts are given preferably so that the name of the base is the name of the element itself, and not an oxide of the element. For instance: carbonate of sodium, instead of carbonate of soda; bicarbonate of potassium, instead of bicarbonate of potassa (or potash); sulphite of calcium, instead of sulphite of lime, etc.

6. Instead of giving the strength of certain solutions by the heretofore customary but very confusing method of using two figures with a colon between, for instance, 1:5, which is variously interpreted as meaning either 1 *in* 5, or as 1 *to* 5 (this being then actually 1 in 6), we use in all cases the former expression (1 in 5, 1 in 10, etc.).

Abbreviations.—gr. stands for grains.
Gm. " " gramme.
C.c. " " cubic centimeter.

STANDARD FORMULAS AND USEFUL RECIPES.

THE WET COLLODION PROCESS.

1.—NEGATIVE COLLODION.

Ether	½ fluid ounce
Absolute alcohol	½ fluid ounce
Pyroxyline	5 gr.
Iodide of ammonium	5 gr.
Bromide of cadmium	2 gr.

2.—FERROTYPE COLLODION (ESTABROOKE'S).

Iodide of ammonium	30 gr.
Iodide of sodium	10 gr.
Iodide of cadmium	20 gr.
Bromide of cadmium	20 gr.
Ether and alcohol (of each)	5 ounces
Pyroxyline, sufficient quantity, say	25 gr.

3.—COLLODION FOR THE REPRODUCTION OF LINE WORK (VOLKMER'S).

Plain Collodion.

Ether	700 C.c.
Alcohol	490 C.c.
Pyroxyline	16 Gm.

Sensitizer.

Chloride of calcium	1.6 Gm.
Iodide of ammonium	4.7 Gm.
Iodide cadmium	7.8 Gm.
Absolute alcohol	123 C.c.

After being perfectly dissolved, mix.

4.—SILVER BATH FOR WET-PLATES.

Nitrate of silver	1 ounce
Distilled water	10 ounces

Iodize and acidulate with nitric acid.

5.—SILVER BATH FOR WET-PLATES (LIESEGANG'S).

Nitrate of silver	10 Gm.
Distilled water	150 C.c.

If the bath fogs add a few drops of iodine solution (1 part iodine to 10 parts of alcohol).

6.—SILVER BATH FOR FERROTYPES (ESTABROOKE'S).

Nitrate of silver	4 ounces
Water	64 ounces
Iodide potassium	2 gr.

Dissolve, sun for three or four hours, filter and acidulate.

7.—DEVELOPER FOR FERROTYPES, BY E. P. GRISHOLD.

Protosulphate of iron and ammonia	4 ounces
Water	64 ounces
Acetic acid, 1.048 (U. S. Ph.)	4 ounces
Yellow rock candy	½ ounce

8.—DEVELOPER FOR WET-PLATES.

Sulphate of iron and ammonia	1 ounce
Acetic acid, 1.048 (U. S. Ph.)	1½ ounce
Water	16 ounces

9.—DEVELOPER FOR HARD NEGATIVES (LINE WORK) WET-PLATES.

Protosulphate of iron	5 Gm.
Water	100 C.c.
Tartaric acid	1 Gm.

10.—Developer for Wet-Plates (Very Intense).

Protosulphate of iron	36 Gm.
Sulphate of copper	12 Gm.
Water	1000 C.c.
Glacial acetic acid, 85 per cent	50 C.c.
Alcohol	40 C.c.

11.—Intensifier for Wet-Plates.

Saturated solution of protosulphate of iron	20 C.c.
Acetic acid, 1.048 (U. S. Ph.)	10 C.c.
Citric acid	5 Gm.
Water	200 Gm.

And silver solution to suit.

12.—Intensifier for Wet-Plates.

Pyrogallic acid	1 Gm.
Citric acid	3 Gm.
Water	80 C.c.

And silver solution to suit.

13.—Intensifier for Line Work, Wet-Plates.

A.—Bromide of potassium	½ ounce
Water	4 ounces
B.—Sulphate of copper	½ ounce
Water	4 ounces

Mix equal parts of A and B and pour on the film. When perfectly whitened, blacken with solution of nitrate of silver, 30 grains to the ounce.

For greater intensity, use hydrosulphate of ammonia solution. 1 part in 4 parts of water, after the bromide of copper, and thorough washing.

14.—Intensifier for Wet-Plates.

Red prussiate of potash	2 drams
Nitrate of lead	3 drams
Water	12 ounces

Immerse the fixed negative till thoroughly whitened; wash, and flood with solution of hydrosulphate of ammonia.

15.—To Strip Collodion Negatives.

The best way to do this is to coat the negative, when dry, with a solution of pure rubber in benzole, and afterwards with leather collodion. When perfectly dry, the edges of the negatives may be cut in, and the plate immersed in a diluted acetic acid solution 1:10. After a short time the film loosens, and may easily be detached from the plate, and turned.

16.—To Rectify a Negative Silver Bath.

Dissolve one part of permanganate of potassium in 100 parts of water and add drop by drop so much of this solution to the bath impregnated with organic matter, till after vigorously shaking a slight pinkish color remains.

Sun for several hours, filter and test for neutrality. Acidify with nitric acid.

DRY COLLODION PROCESSES.

17.—Collodio-Bromide Emulsion.

Ether, sp. g. 0.720	5 fluid ounces
Alcohol, sp. g. 0.820	3 fluid ounces
Pyroxyline	50 gr.
Bromide of cadmium and ammonium	80 gr.
(or bromide of zinc 76 gr.)	

Sensitize by adding to each ounce 15 grains of nitrate of silver, dissolved in one drachm of boiling alcohol mixed with a few drops of water. This is suitable for slow landscape work or transparencies.

18.—Washed Emulsion for Transparencies.

Ether, sp. g., 0.720	5 fluid ounces
Alcohol, sp. g., 0.820	3 fluid ounces
Pyroxyline	60 gr.
Bromide of cadmium and ammonium	100 gr.
(or bromide of zinc	90 gr.)
Hydrochloric acid, sp. g. 1.2	8 minims

Sensitize with 20 grains of nitrate of silver to the ounce, dissolved in 2 drachms of boiling alcohol, mixed with just enough water to effect solution. Allow to stand for two or three days.

The emulsion, after being allowed to ripen, should be poured into a dish and set aside to become thoroughly dry. The mass of dry emulsion is then washed, to remove all soluble salts, and is then again dried and re-dissolved in equal parts of ether and alcohol, at the rate of from 20 to 24 grains to the ounce of the solvents.

19.—Developer for Collodion Emulsion.

A.—Pyrogallol	96 gr.
Alcohol	1 fluid ounce
B.—Bromide of potassium	10 gr.
Water	1 fluid ounce
C.—Stronger ammonia, sp. g., 0.900	1 fluid drachm
Water	15 fluid drachms
or,	
D.—Carbonate of ammonium	2 gr.
Water	1 fluid ounce

For each drachm of developer take for a normal exposure 5 minims of A, 1 or 2 minims of B, and 1 or 2 minims of C, or if D be used, add the above quantities of A, B and C to 1 drachm of D. When the details of the image are out, add double the quantity of B and C.

ALBUMEN PROCESSES.

20.—Gobert's Albumen Process.

Albumen from fresh eggs	26 drachms
Iodide of ammonium	15 gr.
Bromide of potassium	4 gr.
Iodine	4 gr.

Sensitize in

Nitrate of silver	155 grains
Distilled water	4 ounces
Glacial acetic acid	150 gr.

Albumen plates are developed with saturated solution of gallic acid with a few drops of aceto-nitrate of silver solution (1 in 30).

21.—Whipple & Black's Albumen Honey Process.

Albumen	8 ounces
Honey	7 ounces
Iodide of potassium	3 drachms
Bromide of potassium	20 gr.
Chloride of sodium	10 gr.
Water	2 ounces

Sensitize in bath of the following proportions:

Nitrate of silver	1 ounce
Water	10 ounces
Acetic acid	8 to 10 drachms

For development, see above (No. 20).

GELATINE DRY-PLATE PROCESSES.

22.—W. K. Burton's Gelatine Emulsion.

A.—Bromide of ammonium.....260 gr.
Iodide of potassium 20 gr.
Gelatine (Nelson, No. 1)..... 80 gr.
Distilled water..... 10 ounces
B.—Silver nitrate.....200 gr.
C.—Silver nitrate.....200 gr.
Distilled water..... 1 ounce

Converted to ammonio-nitrate.

D.—Gelatine, hard (dry)..... 600 gr.

For detailed directions for making the emulsion, see Photographic Times, Vol. XVII, page 285.

23.—Burbank's Gelatine Emulsion.

Bromide of ammonium.....15 to 20 gr.
Water.....1 ounce

or,

Bromide of potassium.....18 to 25 gr.
Nitrate of silver, proportioned to the amount of bromide.....25 to 30 gr.
Gelatine.....30 to 40 gr.

See Burbank's "The Photographic Negative," pages 87—109.

24.—Henderson's Gelatine Emulsion by Ammonia Method.

Dissolve

Bromide of ammonium.....308 gr.
Gelatine..... 50 gr.

Previously swelled

In distilled water.....8½ ounces

When cold add

Water.....1¾ ounces
Alcohol.....1¾ ounces
Stronger ammonia (0.900).....½ ounce

Next dissolve by heat

Nitrate of silver.....462 gr.
In distilled water.....3¾ ounces

and add gradually to the gelatine solution. Ripening for twenty-four hours gives sensitiveness to the emulsion. Add, finally, 220 grains of swelled gelatine.

25.—Dr. J. M. Eder's Gelatine Emulsion with Ammonio-Nitrate of Silver.

In distilled water, 10 ounces, dissolve bromide of potassium, 370 grains; add gelatine, 617 grains, previously swelled in water. In distilled water, 10 ounces, dissolve nitrate of silver, 462 grains.

To this solution, cold, add stronger ammonia, drop by drop, until the precipitate first formed is re-dissolved. Add this gradually to the first solution, and place in a water bath at a temperature of 105 deg. Fahr., for 30 to 45 minutes. Then remove the source of heat, and allow the emulsion to cool down gradually to about 75 deg. Fahr., then pour out to set, and proceed as usual.

DEVELOPMENT OF GELATINE EMULSION PLATES.

26.—Carbutt's.*

No. 1. *Pyro Stock Solution.*

Distilled water.....10 ounces
Sulphuric acid..... 1 drachm
Sulphite of sodium, crystals..... 4 ounces

Then add Schering's pyro 1 ounce, and water to make 16 fluid ounces.

* Mr. Carbutt uses avoirdupois ounces in all his formulas.—[Editors.]

No. 2. Stock Soda Solution.

Water	10 ounces
Sodium sulphite crystals	2 ounces
Sodium carb. cryst. (or dry gran. 1 ounce)	2 ounces
Potassium carbonate	1 ounce

Dissolve, and add water to make measure 16 fluid ounces.

No. 3. Bromide Solution.

Bromide of sodium or potassium	½ ounce
Water	5 ounces

Pyro Developer.—Dilute 1 ounce of stock No. 2 with 7 ounces of water for cold weather, and 10 to 12 of water in summer. To three ounces of dilute No. 2 add 1½ to 2½ drams of No. 1. The more pyro the denser the negative, and *vice versa*. No yellowing or fogging need be apprehended if our directions are followed. Development should be continued until the image seems almost buried, then wash and place in the following.

27.—CARBUTT'S NEW ACID FIXING AND CLEARING BATH.

Hyphosulpite of sodium	16 ounces
Sulphite of sodium crystals	2 ounces
Sulphuric acid	1 fluid drachm
*Chrome alum	1 ounce
Warm water	64 ounces

Dissolve the hyposulphite of sodium in 48 ounces of water, the sulphite of sodium in 6 ounces of water, mix the sulphuric acid with 2 ounces of water, and pour slowly into the sulphite sodium solution, and add to the hyposulphite, then dissolve the chrome alum in 8 ounces of water, and add to the bulk of solution and the bath is ready. This fixing bath will not discolor until after long usage, and both clears up the shadows of the negative and hardens the film at the same time.

Let remain two or three minutes after negative is cleared of all appearance of silver bromide. Then wash in running water for not less than half an hour to free from any trace of hypo solution. Swab the surface with a wad of wet cotton, rinse, and place in rack to dry spontaneously.

28.—CARBUTT'S HYDROCHINON DEVELOPER.

A.

Warm distilled water	20 ounces
Sulphite of sodium crystals	4 ounces
Sulphuric acid	1 drachm
Hydrochinon	360 gr.
Bromide potassium	30 gr.
Water to make up to	32 ounces

B.

Carbonate potassium	2 ounces
Carbonate sodium crystals	2 ounces
Water to make	32 ounces

C.—*Accelerator.*

Caustic soda (hydr. ox. of sodium)	1 ounce
Water to make	10 ounces

For under exposure add a few drops of above to developer.

D.—*Restrainer.*

Bromide potassium	½ ounce
Water	5 ounces

Hydro Developer.—Take of A 1 ounce, B 1 ounce, water 2 to 4 ounces—the first for instantaneous and short exposures on our Eclipse and special plates, and the latter for time exposures, portraits, and views on our B Landscape and Ortho Plates. For lantern transparencies, 1 ounce A, 1 ounce B, water 4 ounces, 15 to 30 drops of a 10 per cent. solution bromide potassium. After using, filter into bottle for future use, and for starting development on time exposed plates and films.

* N. B.—During cold weather use only ½ ounce of chrome alum in above.



Thomas Mansell, Photo.

Photochrome Engraving Co., N. Y.

RUINS OF VELTON ABBEY.

29.—Eikonogen and Hydrochinon Developer (for Carbutt's Orthochromatic Plates, "Celluloid" Films and Transparencies).

A.

Distilled water	20 ounces
Sulphite of soda crystals	4 ounces
Eikonogen	330 gr.
Hydrochinon	160 gr.
Water to make up to	32 ounces

B.

Distilled water	20 ounces
Carbonate of potash	2 ounces
Carbonate soda crystals	2 ounces
Water to make up to	32 ounces

Developer.—For instantaneous exposures, take 1 ounce A, 1 ounce B, 3 ounces water; for portraits, take 1 ounce A, 1 ounce B, 4 ounces water; for landscapes, full exposures (sen. 20–27), take 1 ounce A, ½ ounce B, 3 ounces water; for landscapes, full exposures (sen. 16–20), take 1 ounce A, ¾ ounce B, 4 ounces water; for lantern slides, full exposures, take 1 ounce A, ¾ ounce B, 4 ounces water, and 2 drops 10 per cent. bromo. potass. to each ounce developer.

Note.—More of A will increase density, more of B will increase detail and softness. Temperature of developer should not vary much below 65 deg. nor above 75 deg. The after treatment is same as with any other developer.

The mixed developer after using can be kept in a bottle for future use.

30.—The Cramer Plate.

Pyro Development.

Prepare the following solutions.

No. 1. *Alkaline Solution.*

U. S. Measures. Troy Weight.		Metric Weights and Measures.
60 ounces	Water	1,800 C.c.
2½ ounces	Carbonate of sodium crystal (sal soda)	75 Gm.
4 to 6 "	Sulphite of sodium crystals	120 to 180 Gm.

(For winter use 4 ounces sulphite, for summer 6 ounces.)

A smaller quantity of sulphite will produce a warmer tone, a larger quantity a gray or bluish black tone.

The alkaline solution must be kept in well stoppered bottles.

If the negatives show yellow stain, make a fresh solution, or try another lot of sulphite of sodium.

(See note below.*)

No. 2. *Pyro Solution.*

6 ounces	Distilled or pure ice water	180 C.c.
15 minims	Sulphuric acid	1 C.c.
1 drachm	Sulphite of sodium crystals	4 Gm.
1 ounce	Pyrogallic acid	30 Gm.

All pyro solutions work best while fresh.

8 grains dry pyro may be substituted for 1 dram of this solution.

No. 3. *Bromide Solution.*

1 ounce	Bromide of potassium	30 Gm.
10 ounces	Water	300 C.c.

* The alkaline solution can be made with the hydrometer by mixing equal parts of the following solutions:
Carbonate of sodium solution (hydrometer test 20 deg.)
Sulphite of sodium solution (hydrometer test for winter 36 deg. for summer 54 deg.)

Developer.

8 ounces	Alkaline solution.....	250 C.c.
3 drachms	Pyro solution.....	12 C.c.
4 to 8 ounces	Tepid water (for winter use).....126 to 250 C.c.	

or

8 to 16 ounces	Cold water (for summer use).....250 to 500 C.c.	
	When the developer is quite new, the addition of from 10 to 40 minims bromide solution....	½ to 3 C.c.
	may be necessary to make it work perfectly clear.	

By modifying the strength and temperature of the developer, dense or thin negatives can be made on plates of the same emulsion.

If dense negatives and quick development are desired, use the developer less diluted and moderately warm (about 70 deg. Fahrenheit), taking care to add sufficient bromide solution to prevent fog. An increase in the quantity of pyro in connection with this treatment will produce the greatest possible contrast and clearness, suitable for copying line drawings, etc.

To obtain thinner negatives full of detail, use the developer more diluted.

Over-exposed plates restrain by adding a sufficient quantity of bromide solution to the developer.

An under-exposed plate should be treated with diluted developer, without addition of bromide in order to obtain more detail and less contrast, or it may be developed with the full strength of alkaline solution and half the quantity of pyro, provided the developer is kept at a very low temperature all the time to prevent fog. It can be improved after development, by throwing off the solution, and without rinsing the negative, leaving it in the dish, pour water upon it and allow to stand for some time well guarded against light before fixing it.

Develop until the intensity is fully sufficient.

31.—EIKONOGEN DEVELOPER.

No. I.

U. S. Measures. Troy Weight.		Metric Weights and Measures.
40 ounces	Distilled water.....	1,200 C.c.
2 ounces	Sulphite of sodium crystals.....	60 Gm.
1 ounce	Eikonogen, finely powdered.....	30 Gm.

Keep the solution in a well stoppered bottle.

No. II.

10 ounces	Water.....	300 C.c.
1 ounce	Carbonate of potassium.....	30 Gm.

No. III.

10 ounces	Water.....	300 C.c.
1 ounce	Bromide of potassium.....	30 Gm.

FOR USE.

3 ounces	Solution No. I.....	90 C.c.
1 ounce	Solution No. II.....	30 C.c.
	When the developer is quite new, it may be found necessary to add	
6 to 12 minims (or drops)	Solution No. III. ½ to 1 C.c.	
	in order to make it work perfectly clear.	

The developer can be used repeatedly by occasionally adding more of Solutions Nos. I and II, omitting the bromide. It produces plenty of intensity by simply leaving the plate in it long enough. Any degree of softness can be obtained by diluting with more or less water, which is also recommended during hot weather and for under-exposures.

Over-exposed plates, restrain by adding more Solution No. III.

Fixing Bath.

After developing and rinsing, the negatives may be fixed in a plain hypo

bath, 1 part hyposulphite of sodium to 4 parts of water, but the following bath is especially recommended.

Prepare two solutions.

No. 1.

32 ounces	Hyposulphite of sodium	1 kilo
3 quarts	Water	3 liters

No. 2.

1 quart	Water	1 liter
½ ounce	Sulphuric acid	15 C.c.
4 ounces	Sulpnite of sodium crystals	120 Gm.
3 ounces	Chrome alum, powdered	90 Gm.

(The chrome alum may be omitted during the cold season.)

After the ingredients are completely dissolved, pour No. 2 solution into No. 1 and allow it to settle before using.

This bath combines the following advantages: It remains clear after frequent use; it does not discolor the negatives and forms no precipitate upon them. The chrome alum hardens the gelatine to such a degree that the negatives can be washed in warm water, provided they have been left in the bath a sufficient time.

32.—HARVARD DRY PLATES.

PYRO DEVELOPER.

No. 1.		No. 2.	
Sulphite sodium, cryst	6 ounces	Carbonate sodium, cryst	4 ounces
Pyrogallic acid	1 ounce	Water	16 ounces
Water (ice or distilled)	16 ounces		

To develop take 1 ounce of No. 1, 1 ounce of No. 2, and 6 to 8 ounces of water.

PYRO DEVELOPER.—BY HYDROMETER TEST.

Make solution sulphite of sodium at 70 deg.

Make solution carbonate of sodium at 45 deg.

No. 1.		No. 2.	
Sulphite sodium solution	16 ounces	Carbonate sodium solution	16 ounces
Pyrogallic acid	1 ounce		

Use 1 ounce of each and 6 ounces of water.

For more intensity, use more of No. 1.

For more detail, use more of No. 2.

Should a grayer negative be desired, increase the sulphite of soda until the color is satisfactory.

In hot weather use less of the alkaline solution and keep the developer cool (below 60 deg. Fahr.), as, if the developer is too warm or contains too much of the alkaline solution, it will work foggy.

A good *eikonogen* developer is as follows:

Sulphite sodium, cryst	1 ounce
Carbonate potassium	1 ounce
Eikonogen	1 ounce
Water	40 ounces

Use repeatedly, adding new as required.

For under-exposed negatives, dilute and keep separate.

After development, and before fixing, it is well to flow the negative with a saturate solution of alum. Rinse and fix in the following solution:

Hyposulphite of sodium	1 pound
Water	2 quarts.

Many prefer to add alum to the fixing solution (about 1 ounce to the above), to which there is no serious objection, provided, always, it is filtered occasionally.

In hot weather add ½ pound powdered alum to the fixing bath.

SEED'S PYRO AND EIKONOGEN FORMULAS.

33.—PYRO DEVELOPER.

No. 1.

Pyrogallic acid	1 ounce
Sulphite of sodium (crystals)	4 ounces
Water (distilled or good well water)	16 ounces

No. 2.

Carbonate sodium crystals	4 ounces
Water	16 ounces

To develop take

No. 1	1 ounce
No. 2	1 ounce
Water	8 ounces

In warm weather use more water, in cold weather, less.

34.—EIKONOGEN DEVELOPER.

No. 1.

Sulphite of sodium (crystals)	3 ounces
Hot water	45 ounces

Thoroughly dissolve, then add:

Eikonogen	1 ounce

No. 2.

Carbonate sodium crystals (or carbonate of potassium, 1¼ ounce)	4 ounces
Water	15 ounces

To develop take of

No. 1	3 ounces
No. 2	1 ounce

If more contrast is required, increase the amount of No. 1; if less, more of No. 2. The developer can be used repeatedly by adding each time a little of each of fresh solutions Nos. 1 and 2, according to above proportions. For developing a number of negatives at once, take 9 ounces of No. 1; 3 ounces of No. 2, and water 12 ounces.

35.—FOR PRODUCING BLACK AND WHITE NEGATIVES.

No. 1.		No. 2.	
Iodine	4 gr.	Bromide of potassium	60 gr.
Alcohol	1½ ounces	Water	25 ounces

Add together Nos. 1 and 2, and to develop add one ounce to every 8 or 10 ounces of developer.

To harden the film during development in hot climates, take sulphate of magnesium 1 ounce, water 8 ounces; add of this one-half ounce to each 16 ounces of developer.

Hypo Solution.

32 ounces sulphite of sodium solution (hydrometer degrees 60), add to this 1 ounce sulphuric acid very slowly, and 24 ounces saturated solution of chrome alum, then add the whole to 1½ gallons saturated solution of hypo, and it is ready for use.

36.—POTASH DEVELOPER FOR GELATINE DRY-PLATES (BEACH'S FORMULA).

A.—*Pyro Solution.*

Sulphite of sodium, cryst	2 ounces
Warm distilled water	2 ounces

Dissolve, and when cold add

Sulphurous acid	2 ounces
Pyrogallol	½ ounce

B.—*Potash Solution.*

1.—Carbonate potassium..... 3 ounces
Water..... 4 ounces
2.—Sulphite sodium, cryst..... 2 ounces
Water..... 3 ounces

Combine 1 and 2 into one solution.

For a shutter exposure take 3 ounces water, half ounce A, and 3 drams B, increasing the latter to 5 drams if the image hangs back.

For over-exposure, 3 ounces water, 3 drams A, 1 dram B, adding more if necessary.

37.—Potash Developer for Gelatine Dry-Plates (Dr. Stolze's).

Modified by Dr. Eder.

A.—Carbonate of potasssium..... 90 Gm.
Sulphite of sodium, cryst..... 25 Gm.
Water..... 200 C.c.
B.—Water..... 100 C.c.
Sulphite of sodium, cryst..... 25 Gm.
Pyrogallol..... 12 Gm.

Mix 40 minims of A with 50 minims of B and 100 c.cm. of water.

Bromide of potassium should be used only in minimal quantities, 1 to 3 minims (of a 10 per cent. solution); with more, the general sensitiveness is much reduced.

An alum bath mixed with an equal volume of saturated sulphate of iron solution increases the density, and gives the plate a good printing quality.

38.—Soda-Potash Developer for Gelatine Dry-Plates (New York Amateur Club).

Ferrocyanide of potassium..... 1½ ounces
Carbonate of potassium..... 1½ ounces
Gran. carbon. of sodium..... 1 ounce
Cryst. sulphite sodium..... 2 ounces
Hot distilled water..... 10 ounces

39.—Soda Developer in one Solution for Gelatine Dry-Plates (Eder's Formula).

Crystallized sulphite of sodium..... 5 drachms
Carbonate of sodium..... 2½ drachms

Dissolve in 2 ounces of boiled distilled water, and after having cooled down add 46 grains of pyro. Keep in well stoppered bottles, and for use dilute with five times its bulk of water.

40.—Ferrous-Oxalate Developer for Gelatine Dry-Plates (Dr. Eder's).

A.—Neutral oxalate potassium..... 200 Gm.
Distilled water..... 800 C.c.

Acidulate with oxalic acid.

B.—Proto sulphate of iron, cryst..... 100 Gm.
Distilled water..... 300 C.c.
Sulphuric acid..... 5 minims
C.—Bromide of potassium..... 10 Gm.
Distilled water..... 100 C.c.
D.—Hyposulphite of sodium..... 2 Gm.
Distilled water..... 200 C.c.

Mix immediately before use three volumes of A with one volume of B, and develop. Restrain with a few drops of C.

For over-exposure take less of the iron solution, and add gradually in small portions, as required, To give the negative body use C.

To make soft negatives with fine detail, take of

A.....250 C.c.
B..... 50 C.c.
C..... 40 minims
D..... 16 minims

Plates giving with ordinary developer hard and glassy negatives, give with this modification very satisfactory results.

41.—HYDROCHINON DEVELOPER, CRAMER'S.

A.—Sulphite of sodium crystals.....480 gr.
Phosphate of sodium.....160 gr.
Water..... 8 ounces

Dissolve, filter and add

B.—Hydrochinon.....100 gr.
Carbonate of sodium.....480 gr.
Phosphate of sodium.....160 gr.
Water..... 8 ounces

Mix equal parts of A and B.

42.—"CHAUTAUQUA" DEVELOPER, WITH AMMONIA, FOR GELATINE DRY-PLATES.

A.—Bromide ammonium..... ½ ounce
Water..... 8 ounces
B.—Stronger ammonia (0.900)..... 1 ounce
Water..... 7 ounces
C.—Pyrogallol..... 1 drachm
Nitric acid..... 5 minims
Water.....12 ounces

Take for correct exposure of A 40 minims, of B 20 minims, of C ½ ounce, and 2 ounces of water.

43.—"CHAUTAUQUA" DEVELOPER, WITH CARBONATE OF SODIUM, FOR GELATINE DRY PLATES.

A.—Dissolve 3 ounces of granulated sulphite of sodium, and ¼ ounce of meta-bisulphite of potassium in 32 ounces of distilled water, and add 1 ounce of pyrogallic acid.

Keep in well stoppered bottles.

B.—Dissolve 8 ounces of granulated, or 16 ounces of crystallized carbonate of sodium (common washing soda) in water enough to make a bulk of 32 ounces.

Mix 1 ounce of water with 1 dram of A, add a few drops of B, and increase gradually till development proceeds regularly. If necessary, restrain with 10 per cent. solution of bromide of potassium.

44.—"CHAUTAUQUA" DEVELOPER, WITH CARBONATE OF POTASSIUM, FOR GELATINE DRY-PLATES.

A.—Pyro..... 1 ounce
Sulphite of sodium, granulated..... 2 ounces
Bromide of potassium.....80 gr.
Citric acid.....60 g..
Water.....12 ounces
B.—Water.....12 ounces
Sulphite of sodium, granulated..... 1 ounce
Carbonate of potash..... 3 ounces

1 dram of each, A and B, to 1 ounce of water, make the developing solution.

45.—"CHAUTAUQUA" DEVELOPER, WITH HYDROCHINON, FOR GELATINE DRY-PLATES.

A.—Hydrochinon..... ¼ ounce
Sulphite of sodium, granulated..... 1 ounce
Meta-bisulphite of potassium.....30 gr.
Water.....16 ounces
B.—Carbonate of potassium..... 1½ ounces
Water.....16 ounces

Take equal parts for normal exposures. For over or under-exposures proceed as with pyro. Bromides do not restrain the action of hydrochinon.

46.—"CHAUTAUQUA" DEVELOPER WITH EIKONOGEN IN TWO SOLUTIONS.

A.—Eikonogen	128 gr.
Crystallized sulphite of sodium	1 ounce
Dissolve in warm water	16 ounces
B.—Crystallized carbonate of sodium	1½ ounce
Water	10 ounces

For normal exposures take 3 parts of A and 1 part of B. To promote intensity add a few drops of a 10 per cent. solution of bromide of potassium.

47.—"CHAUTAUQUA" DEVELOPER WITH EIKONOGEN. (In one solution for instantaneous work.)

Eikonogen	120 gr.
Crystallized sulphite of sodium	1½ ounce

Dissolve in 8 ounces of hot water and add carbonate of potassium 120 grains.

For use dilute with an equal bulk of water, and add a few drops of a 10 per cent. solution of bromide of potassium.

48.—FERROUS OXALATE. See 40.

49.—"CHAUTAUQUA" DEVELOPER, WITH HYDROCHINON, FOR GELATINE DRY-PLATES.

A.—Hydrochinon	120 gr.
Sulphite of sodium, granulated	1 ounce
Meta-bisulphite of potassium	30 gr.
Water	16 ounces
B.—Carbonate potassium	1½ ounce
Water	16 ounces

Take equal parts for normal exposures. For over or under-exposures proceed as with pyro.

50.—THE ACID FIXING AND CLEARING BATH.

Add 2 ounces of S. P. C. Clarifier (acid bisulphite of sodium) to 1 quart of hypo solution 1 in 5.

51.—COMBINED ALUM AND HYPO BATH.

Add saturated solution of sulphite of sodium to saturated solution of alum till the white precipitate formed remains undissolved, and when the odor of sulphurous acid becomes perceptible.

Mix this solution with an equal bulk of freshly prepared hypo solution 1 in 5 and filter.

This bath will remain clear.

52.—CLEARING SOLUTION (EDWARD'S).

Alum	1 ounce
Citric acid	1 ounce
Sulphate of iron, crystals	3 ounces
Water	20 ounces

This should be freshly mixed.

53.—CLEARING SOLUTION ("CHAUTAUQUA").

Alum	1 ounce
Citric acid	¼ ounce
Water	15 ounces

54.—Belitzki's Method for Removing the Last Traces of Hypo.

Chloride of lime..... 20 Gm.
Water..... 1 liter

Add to the milky liquid

Sulphate of zinc..... 40 Gm.

dissolved in from 80 to 100 C.c. of water, shake well and decant.

The clear, supernatant solution of hypochlorite of zinc is kept in well-closed bottles; one part of it mixed with sixty parts of water will remove the last traces of fixing soda.

The solution remains active as long as it smells of hypochlorous acid.

55.—To Remove Hypo from Films.

A solution of bromine in water, about 1 in 30, destroys the hypo in a gelatine film.

56.—Carbutt's Intensifier.

No. 1.

Bichloride of mercury..... 240 gr.
Chloride of ammonium.....240 gr.
Distilled water 20 ounces

No. 2.

Chloride of ammonium.....480 gr.
Water..... 20 ounces

No. 3.

Sulphite of sodium (cryst.)..... 1 ounce
Water..... 9 ounces

Let the plate to be intensified wash for at least half an hour, then lay in alum solution for ten minutes, and again wash thoroughly; this is to insure the perfect elimination of the hypo. The least trace of yellowness after intensifying shows that the washing was not sufficient.

Flow sufficient of No. 1 over the negative to cover it, and allow to either partially or entirely whiten; *the longer it is allowed to act* the *more intense* will be the result; pour off into the sink, then flow over No. 2, and allow to act one minute; wash off, and pour over or immerse in No. 3 until changed entirely to a dark brown or black. No. 3 can be returned to its bottle, but Nos. 1 and 2 had better be thrown away. Wash thoroughly and dry.

57.—Intensifier, with Mercury and Ammonia, for Gelatine Dry-Plates.

Pour over the well-washed negative a saturated solution of mercuric chloride (bichloride of mercury); do not keep it on too long, unless the negative is very thin. Wash well, and immerse in bath of

Water..... . . 10 ounces
Ammonia 10 minims

Leave the plate in this solution until the black color goes quite through the film. Wash well.

58.—Intensifier (Mercuric) with Sodium Sulphite, for Gelatine Dry-Plates.

Whiten the negative in the saturated solution of mercuric chloride, wash and blacken with a solution of sulphite of sodium 1 in 5. Wash well.

The reduction is perfect, with a positive black tone.

59.—Intensifier with Iodide of Mercury.

Dissolve 1 drachm of bichloride of mercury in 10 ounces of water and 3 drachms of iodide of potassium in 2 ounces of water, and pour the iodide solution into the mercury till the red precipitate formed is completely dissolved.

For use, dilute with water, flow over the negative till the proper density is reached and wash, when the deposit will turn yellow. Remove the yellow color by flowing a 5 per cent. solution of hypo over the plate, and give it the final washing.

60.—Intensifier for Gelatine Dry-Plates with Mercuric Chloride and Hydrochinon (Dr. Mallman).

After whitening in the saturated solution of mercuric chloride, as usual, treat with an old hydrochinon developer; the result is a bluish-black intensification, which is applicable to positives as well as negatives.

61.—Intensifier, with Cyanide of Silver, for Gelatine Dry-Plates.

Mr. J. E. Thompson gives the following: After fixing and washing the plate well, place it in a solution of

Bichloride of mercury	10 gr.
Chloride of ammonium	10 gr.
Water	1 ounce

for a few seconds, until it bleaches. Then wash and place in a bath of cyanide of silver until it blackens, made as follows:

Cyanide of potassium	2 ounces
Distilled water	48 ounces
Nitrate of silver	1 ounce
Distilled water	6 ounces

Pour the silver solution gradually into that of the cyanide, stirring with a glass rod. The quantities given are about right to form a precipitate which will re-dissolve afterwards. To be used when a few days old.

62.—Reducer for Gelatine Dry-Plate Negatives (Farmer's).

Sat. sol. of ferricyanide of potassium	1 part
Hyposulphite of sodium solution, 1 in 10	10 parts

63.—Reducer for Gelatine Dry-Plates.

Perchloride of iron	30 gr.
Citric acid	60 gr.
Water	1 pint

64.—Belitski's Acid Ferri-Oxalate Reducer for Gelatine Plates.

Water	7 ounces
Potassium ferric oxalate	2½ drachms
Crystallized neutral sulphite of sodium	2 drachms
Powdered oxalic acid, from	30 to 45 gr.
Hyposulphite of soda	1½ ounce

The solution must be made in this order, filtered, and be kept in tightly-closed bottles; and as under the influence of light the ferric salt is reduced to ferrous, the preparation must be kept in subdued light.

65.—To Reduce Intensity of Negatives.

Rub the parts to be reduced with a soft rag moistened with alcohol, till the density is softened down. For sharply defined outlines use a pointed stick of soft wood dipped in alcohol.

The method may be well applied for the brightening up of flare spots and halation marks.

ORTHOCHROMATIC METHODS BY BATHING.

66.—Orthochromatic Dry-Plates—F. Ives' Chlorophyll and Eosine Process.

Use any good bromide collodion emulsion that contains no free nitrate of silver. Flow plate as usual, and as soon as the emulsion film sets, flow several times with strong alcoholic solution of chlorophyll from blue myrtle, or plantain leaves, then immerse in water strongly tinted with blue shade eosine, and keep in motion until smooth.

Sensitizes for all colors, including deep ruby red; a very light-yellow screen is sufficient to secure correct rendering of color-tone.

67.—Orthochromatic Dry-Plates—V. Schumann's Cyanine Bath.

Soak the plate in 200 C.c. of water and 2 to 4 C.c. of stronger ammonia for two or three minutes, then immerse in

Distilled water	200 C.c.
Alcohol	10 C.c.
Stronger ammonia (0.900)	4 C.c.
Alcoholic solution of cyanine, 1 in 500	10 C.c.

68.—Orthochromatic Dry-Plates—The Chautauqua Erythrosine Bath.

Preliminary Bath.

A.—Water	200 C.c.
Stronger ammonia	2 C.c.

Soak the plate for two minutes.

Color Bath.

Erythrosine solution, 1 in 1000	25 C.c.
Stronger ammonia (0.900)	4 C.c.
Water	175 C.c.

The plate should not remain longer in this bath than one and a quarter minutes.

69.—Obernetter's Method with Nitrate of Silver.

Distilled water	480 C.c.=16 fluid ounces
Nitrate of silver	1.25 Gr.=20 gr.
Ammonium carbonate	5 Gr.=75 gr.
Erythrosine solution (1 in 500)	35 C.c.=1⅛ fluid ounce
Stronger ammonia (0.900)	4 C.c.=1 drachm

Bathe the plate in the preliminary solution (see No. 67) for 150 seconds. Without washing flow the sensitizing solution over the plate twice, and dry in the dark closet.

70.—To Prepare Yellow Glass Screens.

Take of crushed (not powdered) curcuma root, 2 ounces, and macerate in 10 ounces of alcohol for three days. After filtering the tincture, mix with an equal bulk of ether, and add to each ounce of the mixture 6 grains of gun cotton.

With this collodion coat a plane parallel glass plate, which must be perfectly white, thin, and without any curvature.

VARNISHES.

71.—Negative Varnish.

Sandarac	4 ounces
Alcohol	24 ounces
Oil of lavender	3 ounces
Chloroform	5 drachms

72.—Negative Varnish.

White hard varnish (see No. 73)	15 ounces
Alcohol	25 ounces

This will be found a good and cheap varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off. Very suitable for enlarged negatives that are not to be retained.

73.—NEGATIVE VARNISH.

Tough, hard and durable.

Shellac	1½ ounce
Mastic	½ ounce
Oil of turpentine	½ ounce
Sandarac	2½ ounces
Venice turpentine	½ ounce
Camphor	20 grains
Alcohol	20 fluid ounces

74.—NEGATIVE VARNISH.

Sandarac	90 ounces
Venice turpentine	36 ounces
Oil of lavender	10 ounces
Alcohol	500 fluid ounces

75.—STANDARD PHOTOGRAPHIC VARNISH.

White Shellac	8 ounces
Orange shellac	4 ounces
Sandarac	1 ounce
Alcohol	60 fluid ounces

76.—RETOUCHING MEDIUM.

Dammar	70 gr.
Yellow resin	6 drachms
Oil of turpentine	4 ounces

77.—NEGATIVE RETOUCHING VARNISH.

Sandarac	1 ounce
Castor oil	80 gr.
Alcohol	6 ounces

First dissolve the sandarac in the alcohol, and then add the oil.

78.—GROUND-GLASS VARNISH.

Sandarac	90 gr.
Mastic	20 gr.
Ether	2 fluid ounces
Benzol	½ to 1½ fluid ounces

The proportion of the benzole added determines the nature of the mat obtained.

79.—ENCAUSTIC PASTE.

Pure white wax	500 parts
Elemi	10 parts
Benzol	200 parts
Oil of lavender	300 parts
Oil of spike	15 parts

PRINTING AND TONING ON ALBUMENIZED OR PLAIN PAPER.

80.—THE SILVER PRINTING BATH.

Silver nitrate	50 gr.
Water	1 ounce

81.—MODIFIED SILVER BATH.

Silver nitrate	50 gr.
Ammonium nitrate or magnesium nitrate	50 gr.

To secure a neutral state of the bath a little carbonate of silver should be kept at the bottom of the stock bottle.

82.—The Price Toning Formula.

Into 7½ ounces of water dissolve 15 grains chloride of gold and sodium, then add to it 300 grains of acetate of soda and 7 drops of a saturated solution of chloride of lime.

This stock solution should be prepared at least twenty-four hours before being used. Take ½ ounce of it and mix with 5 ounces of water.

83.—The Photographic Times Toning Bath.

Into 7½ ounces of water put 7½ grains chloride of gold and sodium. Label the bottle containing the mixture: *Chloride of gold solution.* Combine 6 ounces of water with 1 ounce *of French azotate*, to which add 1½ ounce of the chloride of gold solution.

84.—The Chautauqua Toning Bath.

Dissolve 15 grains of chloride of gold and sodium in 15 ounces of water. Take of this solution 3 ounces, pour it in the toning tray, test for acidity with litmus paper, and *neutralize* with bicarbonate of soda, and add 30 grains of acetate of sodium and 30 ounces of water. Prepare the solution an hour before using it.

If warm tones are wanted add a little acetic acid to the last washing water.

For this bath the sensitizing silver should be neutral, for which purpose a small portion of carbonate of silver should be kept in the silver stock bottle.

85.—Charles W. Hearn's Toning Baths.

With Sal Soda.

Distilled water	64 ounces
Acid sol. of chloride of gold (4 grains to 1 ounce)	1 ounce
Saturated solution of carbonate of sodium cryst.	½ ounce

Should be prepared half an hour before use.

With Chloride of Lime.

Water	40 ounces
Chloride of lime	5 gr.
Chloride of gold	4 gr.

86.—Abney and Robinson's Toning Baths.

Chloride of gold	1 gr.
Sodium carbonate	10 gr.
Water	10 ounces

Should be used immediately after mixing. This bath gives purple and black tones.

87.—With Chalk and Chloride of Lime.

Chloride of gold	2 gr.
Saturated sol. of chloride of lime	2 drops
Chalk	1 pinch
Water	16 ounces

The bath should be prepared with hot water, and be kept for one day before using it.

88.—Dr. Liesegang's Toning Bath —*With Tungstate of Sodium.*

Tungstate of sodium	20 Gm.
Boiling water	1 liter
Chloride of gold	1 Gm.

89.—Dr. Liesegang's Toning Bath.—*With Phosphate of Sodium.*

Phosphate of sodium	15 Gm.
Chloride of gold	1 Gm.
Water	1 liter

90.—Dr. Liesegang's Toning Bath.—*With Carbonate of Lime (Chalk).*

Chloride of gold	1 Gm.
Carbonate of sodium	15 Gm.
Chalk	5 Gm.
Water	1 liter

After twelve hours the bath is perfectly clear and colorless, when it is ready for use. It is very durable, and gives fine tones.

91.—Toning Bath for Ready Sensitized Paper.

A.—Chloride of gold	1 Gm.
Water	1 liter
B.—Borax	10 Gm.
Tungsate of sodium	40 Gm.
Water	1 liter

92.—Printing on Plain Paper.

Prepare the plain paper with

Ammonium chloride	60 to 80 gr.
Sodium citrate	100 gr.
Sodium chloride	20 to 30 gr.
Gelatine	10 gr.
Distilled water	10 ounces

or,

Ammonium chloride	100 gr.
Gelatine	10 gr.
Water	10 ounces

The gelatine is first swelled in cold water and then dissolved in hot water, and the remaining components of the formula are added. The solution is filtered, and when still warm the paper floated upon it for three minutes.

The salted paper is sensitized upon a neutral forty-five grain silver bath.

93.—Red Prints for Photo-Engravers.

Citric acid	100 gr.
Ammonium chloride	100 gr.
Gelatine	10 gr.
Water	10 ounces

Dissolve the citric acid in a small portion of water, and exactly neutralize with carbonate of soda (228 grains of common washing soda are required).

Float the paper on this bath for one to two minutes, and sensitize upon a fifty-grain nitrate of silver solution. Fix in fresh hypo, without toning.

ARISTOTYPE OR CHLORIDE OF SILVER COLLODION AND CHLORIDE OF SILVER GELATINE PRINTING.

94.—Aristotype, or Chloride of Silver Collodion.

A.—Nitrate of silver	8 Gm.
Alcohol	100 C.c.
B.—Chloride of strontium	2 Gm.
Alcohol	100 C.c.
C.—Citric acid	5 Gm.
Water	100 C.c.
D.—Ether	100 C.c.
Gun cotton	4 Gm.
Alcohol	100 C.c.

To 100 C.c. collodion (D) add first, by constant agitation, 10 C.c. of B and 10 C.c. of C; finally add 5 C.c. of A by vigorously shaking the mixture. The resulting emulsion is allowed to settle for twenty-four hours, and is then used for coating paper.

95.—Chloride of Silver Collodion (Geldmacher's).

Solution 1.

Gun cotton	6½ fluid drachms
Ether	15 fluid ounces
Alcohol	15 fluid ounces
Castor oil	1 drachm

Solution 2.

Nitrate of silver	5 drachms 8 gr.
Water	6 drachms
Alcohol	1½ ounces

Dissolve in a warm water bath.

Solution 3.

Citric acid.....1 drachm 15 grains

dissolved in

Alcohol..... 2½ ounces

and

Chloride of strontium 1 drachm 15 grains

dissolved in

Alcohol.....2½ ounces

Make the two solutions separately and mix.

After all the solutions have been made add No. 3 to No. 1, shake vigorously, and by subdued light add gradually, and in small portions at a time, the No. 2 solution by constant agitating.

After an hour's ripening the collodion emulsion is ready for use.

The paper to be coated must be furnished with a substratum of sulphate of barium and gelatine.

96.—Liesegang's Toning Bath for Aristotypes.

A.—Water	20 ounces
Sulphocyanate of ammonium	1 ounce
Alum	1 ounce
Saturated solution of carbonate of ammonium	20 drops
B.—Water	50 ounces
Chloride of gold	15 gr.

97.—A. Stieglitz's Toning Bath for Aristotypes.

1. Phosphate of sodium	3 drachms
Water	32 ounces
2. Chloride of gold	15 gr.
Water	16 ounces

Mix. Allow to stand for twenty-four hours.

98.—Liesegang's Combined Toning Bath.

Water	32 ounces
Hyposulphite of sodium	8 ounces
Sulphocyanate of ammonium	1 ounce
Acetate of sodium	½ ounce
Saturated solution of alum	2 ounces

and

Water	8 ounces
Chloride of gold	15 gr.
Chloride of ammonium	30 gr.

Pour the gold solution into the hypo solution, then add 30 grains of freshly prepared chloride of silver.

99.—Combined Fixing and Toning Bath for Chloride of Silver Gelatine Paper.—Dr. F. Stolze's.

Hyposulphite of sodium	35 Gm.
Common salt	9 Gm.
Alum	4 Gm.
Sulphocyanate of ammonium	2 Gm.
Water	150 to 200 C.c.

The compound will have matured for use in four to eight days.

Decant the clear solution from the deposit formed and filter. Immedi-

ately before use, add to above quantity, 2 C.c. chloride of gold solution 1 in 100. If the solution does not act with sufficient energy, a few C.c. of saturated alum solution may be added.

100.—The Omega Toning Bath.

Stock Solution.

Water	32 ounces
Hypo	6 ounces
Powdered alum	3 ounces

Let this mixture stand to clear, and decant. For toning about fifty cabinets take 8 ounces of this stock solution, and add to it, just before use, 4 grains chloride of gold, dissolved in ½ ounce of water, 10 grains nitrate of lead, dissolved in 1 ounce of water; and 80 grains sulpho-cyanate ammonium (imported), in crystals, shaking well after each addition. This bath can be used repeatedly if kept cool, but will not yield as clear results as when freshly prepared. The stock solution should be put up in a larger quantity, and as much as is needed for each batch of prints mixed from it. Prints should be washed after toning and fixing for about two hours in running water. They are then treated like albumen or aristo prints, mounted and burnished, or squeegeed, face down, on a ferrotype plate, thus obtaining a glacé finish.

PRINTING ON SUBSTANCES OTHER THAN PAPER.

101.—Collodion for Porcelain Pictures.

Fennemore's Method.

A.—Negative gun cotton	60 gr.
Alcohol	2 ounces
Ether	3 ounces

Dissolve 120 grains nitrate of silver in 3 ounces of hot alcohol, and add by constant stirring to the above collodion.

B.—Chloride of strontium	32 gr.
Citric acid	24 gr.

Reduce to a fine powder and dissolve in four ounces of alcohol, add

Ether	4 ounces
Gun cotton	60 gr.

The two collodions are to be mixed in equal proportions.

102.

Hern's Method.

A.—Alcohol	7 ounces
Ether	9 ounces
Gun cotton	112 gr.
B.—Nitrate of silver	486 gr.
Distilled water	1 ounce
C.—Chloride of calcium	128 gr.
Alcohol	4 ounces
D.—Citric acid	128 gr.
Alcohol	4 ounces

Decant 8 ounces of A, add 64 drops of B in small portions, stirring up well after every addition, and 4 drams of C in the same way. Finally 4 drachms of D must be added in the same manner as the calcium solution.

103.—Printing on Silk.

Boiling water	80 ounces
Chloride of ammonium	100 gr.
Iceland moss	60 gr.

When nearly cold, filter and immerse the silk for fifteen minutes. Sen-

sitize for fifteen minutes in an acid 20-grain silver bath, and when dry stretch the fabric over cardboard. Print deeper than usual and tone in

Water	20 ounces
Acetate of sodium	2 drachms
Chloride of gold	3 gr.
Common whiting	a few gr.

104.—Making Silver Prints on Wood.

Gelatine	45 gr.
White soap	45 gr.
Water	5½ fluid ounces.

Soak the gelatine in water for five or six hours, then dissolve it with the aid of a water bath. Cut the soap into small pieces, and add to the gelatine solution, stirring the whole with a glass rod to insure a perfect mixture, then add powdered alum until the froth disappears, and strain through muslin. Cover the block with this mixture and a little zinc white, then wipe off so that a very thin film will be left, rubbing it gently, so that the film may be of as even a thickness as possible. After drying, apply with a badger's-hair brush a coating of the following composition:

Albumen	3½ fluid ounces
Water	2½ fluid ounces
Chloride of ammonium	67½ gr.
Citric acid	18¾ gr.

Whip the albumen to a froth, and allow it to settle; to the limpid portion add the water, then the sal ammonia, and carefully stir with a glass rod, then add the citric acid. When the block is dry, sensitize with a solution of

Nitrate of silver	187½ gr.
Water	3½ fluid ounces

Pour this upon the surface of the block, spread it evenly with a glass rod, and pour off the excess. When the block is dry, expose it under a negative in the usual manner, until it is printed the exact shade desired. When printed, immerse the printed surface in a very strong solution of salt for about three minutes. Then wash it under a stream of water for a short time, and fix it by placing it face downward in a saturated solution of hyposulphite of soda. After fixing, wash under a stream of water for about ten minutes; when dry, it is finished, and ready for the engraver.

105.—To Transfer Photographs upon Wood for Engraving.

Float the reverse side of sensitized albumen paper for fifteen minutes upon a 4 per cent. solution of bichromate of potassium, dry well, expose to light till the picture is fairly visible, place the print upon a glass plate under water until the unacted-on bichromate is dissolved out; after removal from the water, roll in with fatty ink.

When the picture is sufficiently blackened, and nearly dry, it can be transferred upon the engraver's block by rubbing it on carefully.

PRINTING WITH THE SALTS OF IRON.

106.—Cyanotypes or Blue Prints.

A.—Citrate of iron and ammonium	1¼ ounces
Water	8 ounces
B.—Ferricyanide of potassium	1¼ ounce
Water	8 ounces

Mix equal parts immediately before use and float the paper, Rives plain, upon it for three minutes; hang up to dry.

107.—Developer for "Star" Bromide of Silver Paper.

No. 1.

Neutral potassium oxalate	8 ounces
Water	24 ounces
Oxalic acid	1 dram

No. 2.

Protosulphate of iron	8 ounces
Water	24 ounces
Sulphuric acid	15 minims

The developer is composed of six volumes of No. 1 and one volume of No. 2. For the development of a 5 x 8 print about 2 ounces is sufficient, and the mixture may be made by adding ¼ of an ounce of No. 2 to 6 quarter ounces, or 1½ ounces of No. 1.

After the print is thoroughly developed, without washing remove it to the clearing solution, consisting of 2 drachms acetic acid and 20 ounces of water, or 1 drachm of citric acid in the same quantity of water.

When thoroughly cleared and washed remove the print to the fixing bath; a solution of 5 ounces sodium hypo sulphite in 30 ounces of water. Immerse the print in this solution, face down, and let it remain there for six or eight minutes, and in absolute contact with the bath. Owing to the absence of silver iodide and the extremely thin gelatine film, fixing is done rapidly.

Finally wash in repeated changes of water.

108.—The Kallitype.

Coat stout but fine grained paper with a solution of

Sodium ferric-oxalate	6 drachms
Water	2½ ounces

Dry quickly without the application of heat, and print till the deeper shadow portions of the picture become visible. On removal of the print from the frame immerse into a 1½ per cent. solution of nitrate of silver acidified slightly with citric acid, when the picture will develop brilliantly and with all detail.

Finally wash in pure water. A yellow tinge may be washed away with a 5 per cent. solution of oxalic acid.

109.—Converting Blue Prints into Brown Prints.

Blue ferro-prussiate photographic prints may be converted into brown prints by the following process:

The positive blue print, thoroughly washed and dried, is plunged into a solution of ammonia, in which it is kept until it has nearly or entirely lost its color. (The operation lasts from two to four minutes.) The print is rinsed and plunged into a bath of tannic acid, the operation being stopped as soon as the desired sharpness and tone are obtained.

This last operation requires about ten minutes. If at the end of this time the color be not dark enough, it is intensified by adding to the bath a few drops of ammonia. After a lapse of one or two minutes, rinse in abundant water.

1. Solution for preparing the sensitized paper:

Tartrate of iron and potassium	15 Gm.
Red prussiate of potash	12 Gm.
Rain water	250 C.c.

2. Solution to remove the color of the print:

Stronger ammonia (0.900)	100 C.c.
Rain water	800 C.c.

5. Solution to give the brown tone:

Tannic acid	10 Gm.
Rain water	500 C.c.

Dissolve and filter.

110.—Toning Blue Prints.

Blue prints may be given the black tone by plunging them into a solution of 4 parts of potash in 100 parts of water; then, when the blue color has entirely disappeared under the action of the potash, and a yellowish color has taken its place, they are immersed in a solution of 4 parts of tannin in 100 parts of water; then washing them again we obtain prints whose tone may be assimilated to that of pale writing ink.

111.—Pellett's Method for Making Blue Lines upon White Ground.

The formula is composed as follows:

Gum arabic	385 gr.
Sodium chloride	46 gr.
Tartaric acid	62 gr.
Perchloride of iron	123 gr.
Water	3½ ounces

Highly sized and smooth paper is evenly coated with this mixture, dried in the dark, and exposed under a negative.

Develop with a saturated solution of ferrocyanide of potassium. Fix in a 1 to 20 solution of hydrochloric acid.

112.—Black Lines Upon White Ground.

Water	9 ounces
Gelatine	3 drachms
Solution of perchloride of iron (U. S. Ph.)	6 drachms
Tartaric acid	3 drachms
Ferric sulphate	3 drachms

Dissolve, filter and apply to the surface of stout paper (Steinbach medium roll).

After exposure to light, under a diapositive or drawing, immerse the print in

Gallic acid	6 drachms
Alcohol	6½ ounces
Water	32 ounces

when the greenish-yellow print will turn to inky black.

Finally wash in pure water.

USEFUL RECEIPTS.

113.—To Find the Focal Length of a Lens.—W. H. Sherman's Rule.

Make two images of any object of convenient length, so that the *difference* between the images will be equal to some part of the object, making the position of the ground glass on the base of the camera where each image is in focus. The distance between the two positions of the ground glass thus found will be the same part of the focal length that the difference of the two images is of the object.

Example: With two images of a foot-rule; let one image be 8 inches long and the other 4 inches. The difference being one-third the length of the object, the distance between the two positions of the ground glass will be one-third of the focal length of the lens.

114.—To Calculate the Focal Fraction of Stops for Lenses.

Divide the focal length obtained by the above method expressed in inches and hundredths, by the diameter of stop opening expressed in hundredths of an inch.

115.—Labarraque's Solution.

Chloride of lime	2 ounces
Carbonate of sodium, cryst	4 ounces
Water	40 ounces

Mix the chloride of lime with 30 ounces of the water, and dissolve the carbonate of soda in the remainder. Mix, boil and filter.

116.—Eau de Javelle.

Dry chloride of lime	2 ounces
Carbonate of potash	4 ounces
Water	40 ounces

Mix the chloride of lime with half of the water; dissolve the carbonate of potash in the remainder. Mix, boil and filter.

117.—A Few Remedies Against Blistering of Albumen Paper.

Do not dry the paper by excessive heat.
Avoid acidity in solutions.
Moisten the print before washing with a sponge saturated in alcohol.
Immerse the print before fixing in a weak alum
Add a trace of aqua ammonia to the fixing bath.

118.—Mat Black Varnish.

A tolerably strong solution of sandarac in alcohol, mixed with fine lampblack, dries without gloss, becomes hard without being brittle, and may be applied with a fine brush upon almost any substance.

119.—Invisible Ink.

Chloride of cobalt	50 gr.
Distilled water	1 fluid ounce
Glycerine	10 minims

Dissolve the chloride of cobalt in the distilled water, and add the glycerine.

Writing executed with this ink is invisible on paper, but on warming the writing turns blue. On exposure to damp air it becomes invisible again.

120.—Solution for Making Paper Adhere to Metal.

Tragacanth	30 Gm.
Gum Arabic	120 Gm.
Water	500 c.c.

121.—To Precipitate Gold from Spent Sulphocyanate Toning Baths.

Add sulphuric acid and heat, when the gold will separate.

122.—To Keep Unmounted Albumen Prints Flat.

Soak them in equal parts of alcohol, glycerine and water; dry between blotting paper under slight pressure.

123.—Magic Photographs.

Fix an albumen print in perfectly fresh hypo solution and wash well, and soak it in a solution of 1 part bichloride of mercury, ¼ of a part of chloride of ammonium in 60 parts of water, till the photograph is bleached out.

The picture will appear again when brought into contact with hypo solution, or moistened blotting paper previously prepared with the fixing soda.

124.—Solution for Mounting Prints Without their Cockling.

Nelson's No. 1 photographic gelatine	4 ounces
Water	16 ounces
Glycerine	1 ounce
Alcohol	5 ounces

Dissolve the gelatine in the water, then add the glycerine, and lastly the alcohol.

125.—Permanent Paste.

Arrowroot	10 Gm.
Water	100 Gm.

in which 1 gram of gelatine has been soaked, and boil. After cooling add 10 grams of alcohol and a few drops of carbolic acid.

126.—Leather Collodion.

2 p. c. Collodion	100 parts
Castor oil	4 parts

127.—Lubricator for Hot Burnishing.

Spermaceti	10 Gm.
Castile soap	10 Gm.
Alcohol	1 liter

128.—To Remove Silver Stains from the Hands.

Sulphate of sodium (Glauber's salt)	½ ounce
Chloride of lime	½ ounce
Water	1 ounce

Mix thoroughly, and apply with an old toothbrush.

129.—To Frost a Skylight.

Very thin starch paste, to which unboiled starch has been added. Must be free from lumps, and be daubed on with a large bristle brush.

130.—To Keep the Hands Soft and White.

Apply before retiring:

Glycerine	2 ounces
Bay rum	6 ounces
Oil cajeput	1 dram
Oil bergamot	1 dram

Mix well.

131.—To Remove Nitric Acid Stains from Hands or Garments.

Touch the stains with solution of permanganate of potassium; wash, rinse in dilute hydrochloride acid, and wash again.

132.—To Remove Yellow Stains from Bromide Prints.

Soak for one or two hours in

Acetic acid	2 ounces
Sat. oxalate of potassium solution	4 ounces

133.—To Remove Pyro Stains from Fingers.

Wash with a 10 per cent. solution of oxalic acid, or sulphuric acid, diluted with water, 1 : 20.

134.—To Remove Yellow Stains from Pyro-Developed Negatives.

Bathe them in sulphurous acid water or in a 10 per cent. solution of sulphite of soda, to which a few drops of sulphuric acid has been added.

135.—To Remove the Odor of Hydrosulphate of Ammonium from the Dark Room.

Sprinkle the floor with a solution of nitrate of lead.

136.—To Avoid Halation.

A quick drying coating, which is applied to the back of the plate, consists of collodion, with which any dark red or brown pigment is mixed. Spanish brown or rouge answers well.

137.—To Recover Silver Bromide from Waste Emulsion.

Let the emulsion be melted, and then add a small quantity of hydrochloric acid, following by boiling for two or three minutes. The silver bromide precipitates, and the destroyed gelatine is then poured off. The bromide is then placed among the other residues for reduction.

138.—Toning Bath for Gelatine Lantern Slides.

Chloride of platinum	1 gr.
Hydrochloric acid	1 minim
Water	32 ounces

139.—Compound for Blocking out Large Portions of a Negative.

Mix alphaltum varnish with fine lamp-black and apply with a camel's-hair brush.

Should be kept in well-stoppered bottles.

140.—Flash-Light Powder for Orthochromatic Plates.

Pure metallic magnesium powder	10 gr.
Nitrate of sodium (finely powdered)	from 50 to 70 gr.

141.—Largest and Smallest Quantities of Chemicals Admitted to the Pyro Developer.

	Largest.	Smallest.
Pyro, per ounce	10 gr.	1¼ gr.
Sulphite of sodium	80 gr.	5 gr.
Carb. of sodium	40 gr.	1 1-5 gr.
Carb. of potassium	21 2-10 gr.	5 gr.

142.—Consumption of Chemicals in Silver Printing on Albumenized Paper.

Of 100 parts of silver used in the albumen printing process will be found

In the finished print	3 per cent
In filters, blotters and cuttings	7 per cent
In the wash water before toning	50 to 55 per cent
In the fixing bath	30 to 35 per cent
In the wash water after fixing	5 per cent

90 per cent. of the silver used may be recovered.

One sheet of paper, 18 x 22, will take from the silver bath from 30 to 45 grains of nitrate of silver.

One sheet of paper, 18 x 22, requires to tone 1½ grains of gold (1 decigram).

About 80 to 90 grains of hyposulphite of sodium are necessary to fix one sheet of paper, 18 x 22.

143.—Directions for Removing White Spots from Silicate Material.

At any time you find the white spots or mineral appearing on the surface put a few drops of sweet (sewing machine) oil on a rag, *rub it into the rag* and then over the surface, and they will always be clear and free from spots.

TABLE OF THE SYMBOLS, ATOMICITY, ATOMIC AND EQUIVALENT WEIGHTS OF THE ELEMENTS.

	Symbol and Atomicity.	Atomic Weight.	Equivalent Weight.
Aluminium	Al^{iv}	27.5	9.13
Antimony (Stibium)	Sb^{v}	120.0	40.66
Arsenic	As^{v}	75.0	25.0
Barium	Ba^{ii}	137.0	68.5
Beryllium, or Glucinum	Be^{ii}	9.4	4.7
Bismuth	Bi^{v}	208.0	69.33
Boron	B^{iii}	11.0	3.66
Bromine	Br^{i}	80.0	80.0
Cadmium	Cd^{ii}	112.0	56.0
Cæsium	Cs^{i}	133.0	133.0
Calcium	Ca^{ii}	40.0	20.0
Carbon	C^{iv}	12.0	3.0
Cerium	Ce^{iv}	138.0	46.0
Chlorine	Cl^{i}	35.5	35.5
Chromium	Cr^{vi}	52.5	26.1
Cobalt	Co^{vi}	59.0	29.4
Copper (Cuprum) { Cuprosum	Cu^{i}	63.4	63.4
Copper (Cuprum) { Cupricum	Cu^{ii}	63.4	31.7
Columbium (Niobium)	Cb^{v}	94.0	18.8
Didymium	D^{iv}	145.0	47.5
Erbium	Eb^{ii}	112.6	56.3
Fluorine	Fl^{i}	19.0	19.0
Gallium	—	—	—
Germanium	Gr^{iv}	72.31	—
Gold (Aurum)	Au^{iii}	196.7	65.33
Hydrogen	H^{i}	1.0	1.0
Indium	In^{iii}	113.4	37.8
Iodine	I^{i}	127.0	127.0
Iridium	Ir^{i}	193.0	49.5
Iron (Ferrum) { Ferrosum	Fe^{ii}	56	28
Iron (Ferrum) { Ferricum	Fe^{iii}	56	18.67
Lanthanium	La^{ii}	92.8	46.4
Lead (Plumbum)	Pb^{iv}	207.0	103.5
Lithium	L^{i}	7.0	7.0
Magnesium	Mg^{ii}	24.0	12.0
Manganese	Mn^{ii}	55.0	27.5
Mercury (Hydrargyrum) { Mercurosum.	Hg^{i}	200.0	200.0
Mercury (Hydrargyrum) { Mercuricum..	Hg^{ii}	200.0	100.0
Molybdenum	Mo^{ii}	92	46.0

TABLE OF SYMBOLS, ETC.—(*Continued.*)

	Symbol and Atomicity.	Atomic Weight.	Equivalent Weight.
Nickel	Ni^{ii}	58.8	29.4
Nitrogen	N^{iii}	14	4.66
Osmium	Os^{iv}	199	49.75
Oxygen	O^{ii}	16	8.0
Palladium	Pd^{ii}	106.5	53.25
Phosphorus	P^{iii}	31.0	10.33
Platinum { Platinosum	Pt^{ii}	197.4	98.7
Platinum { Platinicum	Pt^{iv}	197.4	49.35
Potassium (Kalium)	K^{i}	39.0	39.0
Rhodium	Rh^{ii}	104.3	52.2
Rubidium	Rb^{i}	85.4	85.4
Ruthenium	Ru^{iv}	104.2	26.0
Selenium	Se^{ii}	79.4	39.7
Silicon (Silicium)	Si^{iv}	28.0	7.0
Silver (Argentum)	Ag^{i}	108.0	108.0
Sodium (Natrium)	Na^{i}	23.0	23.0
Strontium	Sr^{ii}	87.5	43.75
Sulphur	S^{ii}	32.0	16.0
Tantalum	Ta^{v}	182.0	36.4
Tellurium	Te^{ii}	128.0	64.0
Thallium	Tl^{i}	204.0	204.0
Thorinum (Thorium)	Th^{iv}	231.5	57.87
Tin (Stannum) { Stannosum	Sn^{ii}	118.0	59.0
Tin (Stannum) { Stannicum	Sn^{iv}	118.0	29.5
Titanium	Ti^{iv}	50.0	12.5
Tungsten (Wolfram)	W^{iv}	184.0	46.0
Uranium	U^{ii}	120.0	60.0
Vanadium	V^{iii}	51.3	17.1
Yttrium	Y^{ii}	61.7	30.85
Zinc	Zn^{ii}	65.2	32.6
Zirconium	Zr^{iv}	89.6	22 4

TABLE OF SYMBOLS, MOLECULAR WEIGHT AND SOLUBILITIES OF THE PRINCIPAL CHEMICALS USED IN PHOTOGRAPHY.

Abbreviations.—s., soluble; v. s., very soluble; sp. s., sparingly soluble; n. s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water.	Alcohol.
Acid, Acetic, Glacial	$H,C_2H_3O_2$	60	s.	s.	s.
" Boracic or Boric	H_3BO_3	62	25	3	1 in 6
" Carbolic (see Phenol)	C_6H_5OH	94	16.6	s.	s.
" Chlorhydric (see Hydrochloric)					
" Citric	$C_6H_5O_7+H_2O$	210	.75	.5	n. s.
" Digallic (see Tannic Acid)					
" Formic	H,CHO_2	46			
" Gallic	$H,C_7H_5O_5+H_2O$	170	100	3	1 in 8
" Hydrobromic	HBr	81	s.	s.	s.
" Hydriodic	HI	128	s.	s.	s.
" Hydrochloric	HCl	36.5	s.	s.	s.
" Hydrocyanic	HCy	27	s.	s.	s.
" Hydrosulphuric	H_2S	34			
" Muriatic (see Hydrochloric)					
" Nitric	HNO_3	63	s.	s.	s.
" Nitrous	HNO_2	47	s.	s.	s.
" Oxalic	$H_2C_2O_4,2H_2O$	126	9	dec.	dec.
" Pyrogallic (see Pyrogallol)	$H_3C_6H_3O_3$	126	3.5	8	v.s.& ether
" Salicylic	$HC_7H_5O_3$	138	7.60	9	v.s.& ether
" Sulphuric	H_2SO_4	98			
" Sulphurous	H_2SO_3	82	s.	s.	also in ether
" Tannic (see Digallic Acid)	$H_4C_{27}H_{18}O_{17}$	618	.8	.5	10 in 8
" Tartaric	$H_4C_4H_2O_6$	150	.8	.5	1 in 5
Alcohol, Ethyl	C_2H_5OH	46	in all proportions.		

Alcohol, Methyl (see Wood Alcohol)	CH_3HO	32	in	all proportions.	
Alum (see Potassium Aluminium Sulphate)					
Alum Chrome (see Potassium Chromic Sulph.)					
Ammonia, Gaseous	H_3N	17	v. s.		
Ammonium, Bichromate	$(NH_4)_2Cr_2O_7$	253	v. s.	v. s.	
" Bromide	NH_4Br	98	1.5	v. s.	1 in 13
" Carbonate (see Sal volatile)	$(NH^4)_2CO_3+(NH^4)HCO_3$	175	4	dec.	sp. s.
" Chloride (see Sal ammoniac)	NH_4Cl	53.5	3	1	sp. s.
" Fluoride	NH_4Fl	37	v. s.	v. s.	sp. s.
" Iodide	NH_4I	145	1	.5	s.
" Nitrate	NH_4NO_3	80	2	1	s.
" Oxalate	$(NH_4)_2C_2O_4$	124	5	v. s.	n. s.
" Sulphide	NH_4HS	51	v. s.	v. s.	1:2
" Sulpho cyanate	NH_4CNS	76	1	5	s.
Barium, Bromide	$BaBr_2$	297	.90	.75	s.
" Chloride	$BaCl_2,2H_2O$	244	2.18	1.5	sp. s.
" Iodide	BaI_2	391	.48	.35	v. s.
" Per-oxide	BaO_2	169	n. s.	n. s.	in hdchl. acid
Bicarbonate of Potassa (see Potassium Bicarb)					
Bicarbonate of Soda (see Sodium Bicarbonate)					
Bichloride of Mercury (see Mercuric Chloride)					
Bromine	Br	79.8	s.	s.	s.
Borax (see Sodium Biborate)					
Cadmium, Bromide	$CdBr_2,4H_4O$	344	1.5	1	sp. s.
" Chloride	$CdCl_2 2H_2O$	219	.71	.67	sp. s.
" Iodide	CdI_2	294	1.5	1	1 in 2
Calcium, Bromide	$CaBr_2,4H_2O$	272	1	.75	s.
" Carbonate (see Chalk)	$CaCO_3$	100	n. s.	n. s.	n. s.
" Chloride	$CaCl_2$	111	.75	.5	1 in 10
" Hypochlorite (see Chloride of Lime)	$CaCl_2O_2CaCl_2$	254	sp. s.	sp.	dec.
" Iodide	CaI_2	294	.75	.5	1 in 10
Calomel (see Mercurous Chloride)					
Carbonate of Ammonia (see Ammonium Carb)					
" Potash (see Potassium Carbonate)					
" Soda (see Sodium Carbonate)					

TABLE OF SYMBOLS, MOLECULAR WEIGHT AND SOLUBILITIES OF THE PRINCIPAL CHEMICALS USED IN PHOTOGRAPHY.

Abbreviations.—s., soluble; v. s., very soluble; sp. s., sparingly soluble; n. s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water	Alcohol.
Caustic Potash (see Potassium Hydrate)					
" Soda (see Sodium Hydrate)					
Chalk (see Calcium Carbonate)					
Chloride of Lime (see Calcium Hypochlorite)					
Chlorine	Cl	35.5	1:2.5	Volumes.	
Chrome, Alum (see Potassium Chromic Sulph.)					
Copper Acetate (see Verdigris)	$Cu(C_3H_3O_2)_2,H_2O$	199	14	5	1 in 14
" Bromide	$CuBr_2$	223.4	1	.75	s.
" Chloride	$CuCl_2,H_2O$	170.5	1	.75	v. s.
" Sulphate (see Blue Vitriol)	$CuSO_4,5H_2O$	249.2	3	1	n. s.
" " and Ammonia	$CuSO_4,4NH_3+H_2O$	245.5	s.	v. s.	n. s.
Corrosive sublimate (see Mercuric Chloride)					
Epsom Salts (see Magesium Sulphate)					
Glaubers Salt (see Sodium Sulphate)					
Glycerine	$C_3H_5(HO)_3$	92	s.	s.	s.
Gold, Perchloride	$AuCl_3+H_2O$	339.2	1	.75	also in ether
Green Vitriol (see Iron Sulphate)					
Hydroquinone	C_6H_42HO	110	3	s.	also in ether
Hydroxylamine Chloride	NH_2OHCl	69.5	v. s.	v. s.	n. s.
Iodine	I	127	sp. s.	sp. s.	v. s.
Iron, Ammonium Sulphate	$FeSO_4(NH_4)_2SO_4+6H_2O$	392	v. s.	dec.	n. s.
" Chloride (Ferric)	Fe_2Cl_6	325	.75	.5	1 in 1
" Chloride (Ferrous)	$FeCl_2$	127	2	1	1 in 1
" Citrate	$Fe_2(C_6H_5O_7)_2$	598	s.	s.	n. s.

Iron, Iodide	FeI_2	310	v. s.	v. s.	v. s.
" Nitrate	$Fe(NO_3)_2,6H_2O$	288	v. s.	dec.	dec.
" Oxalate (Ferric)	$Fe_2(C_2O_4)_3$	376	s.	s.	n. s.
" " (Ferrous)	FeC_2O_4	144	In potas	sium oxal.	n. s.
" Sulphate (Ferric)	$Fe_2(SO_4)_3$	400	s.	dec.	s.
" " (Ferrous)	$FeSO_4,7H_2O$	278	1.5	1	n. s.
Lead, Acetate (see Sugar of Lead)	$Pb.(C_2H_3O_2)_2.3H_2O$	378	2.5	2	1 in 12.5
" Carbonate	$PbCO_4$	366	n. s.	sp. s.	n. s.
" Iodide	PbI_2	460	s.	s.	n. s.
" Nitrate	$Pb(NO_3)_2$	330	7.7	7	s.
" Oxide	PbO	222.4	n. s.	n. s.	Alkalis.
Lithium, Bromide	LiBr	87	.66	.5	v. s.
" Chloride	$LiCl+H_2O$	60.5	1.3	1	s.
" Iodide	LiI	134	.61	.5	s.
Magnesium, Bromide	$MgBr_2$	184	1	.75	s.
" Chloride	$MgCl_2$	95	2	1.5	s.
" Iodide	MgI_2	246.3	1	.75	v. s.
" Sulphate (see Epsom Salt)	$MgSO_4,7H_2O$	246	1.3	1	sp. s.
Mercury, Chloride (Mercuric) (see Corros. Subl.)	$HgCl_2$	271	19	3	5
" " (Mercurous) (see Calomel)	Hg_2Cl	235.5	n. s.	n. s.	n. s.
" Cyanide	$HgCy_2$	252	8	2	1 in 20
" Iodide (Mercuric)	HgI_2	454	sp. s.	sp. s.	sp. s.
" " (Mercurous)	Hg_2I	654	n. s.	n. s.	n. s.
Phenol (see Carbolic Acid)					
Platinum Chloride	$PtCl_4+8H_2O$	479.5	1	.5	s.
Potassa (see Potassium Hydrate)					
Potassium, Aluminium Sulphate (see Alum)	$Al_2(SO_4)_3,K_2SO_4,24H_2O$	948	10	8	n. s.
" Bicarbonate	$KHCO_3$	100	3	2	n. s.
" Bichromate	$K_2Cr_2O_7$	295	10	7	n. s.
" Bromide	KBr	119	2	1	1 in 90
" Carbonate	$KO_2C_3+2H_2O$	174	.75	.5	n. s.
" Chlorate	$KClO_3$	122.5	16	2	n. s.
" Chloride	KCl	74.5	3	2	sp. s.
" Chromic Sulph. (see Chrome Alum)	$Cr_2(SO_4)_3,K_2SO_4,24H_2O$	999	10	dec.	n. s.
" Citrate	$K_3C_6H_5O_7H_2O$	324.3	6.6	.3	n. s.

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Abbreviations.—s., soluble; v. s., very soluble; sp. s., sparingly soluble; n. s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water.	Alcohol.
Potassium, Cyanide	KCy	65.1	1	.5	sp. s.
" Ferric Sulphate	$K_2SO_4.Fe_2(SO_4)_3,24H_2O$	100.6	s.	s.	n. s.
" Ferri-cyanide (see Red Prussiate)	$K_6Fe_2Cy_{12}$	658.6	2.5	1.2	n. s.
" Ferro-cyanide (see Yellow Pruss.)	K_4FeCy_6	368.4	3	1	n. s.
" Fluoride	$KFl+2H_2O$	94	v. s.	v. s.	v. s.
" Hydrate	KOH	56	.5	.25	sp. s.
" Iodide	KI	166	.75	.5	1 in 16
" Nitrate (see Saltpetre)	KNO_3	101	4	1	n. s.
" Oxalate	$KC_2O_4H_2O$	235	3	2	sp. s.
" Permanganate	$KMnO_4$	158	16	10	n. s.
" Platino-chloride	K_2PtCl_6	414.9	10	1	s.
" Sulpho-cyanate	KCyS	97	2	1	sp. s.
Prussiate of Potash, red (see Potassium Ferri-cyanide)					
Prussiate of Potash, yellow (see Potassium Ferro-cyanide)					
Pyrogallol (see Pyrogallic acid)					
Sal ammoniac (see Ammonium Chloride)					
Sal soda (see Sodium Carbonate)					
Sal tartar (see Potassium Carbonate)					
Saleratus (see Potassium Bicarbonate)					
Sal volatile (see Ammonium Carbonate)					
Salt, common (see Sodium Chloride)					
Saltpetre (see Potassium Nitrate)					

Saltpetre of Chili (see Sodium Nitrate)					
Sesqui-Carbonate of Soda (see Sodium Carb.)					
Silver, Acetate	$AgC_2H_3O_2$	167	sp. s.	sp. s.	n. s.
" Bromide	AgBr	188	n. s.	n. s.	in HCl and HBr.
" Carbonate	Ag_2CO_3	276	n. s.	n. s.	n. s.
" Chloride	AgCl	143.5	n. s.	n. s.	Ammonia, cyan. potass. hyposulphite of soda.
" Citrate	$Ag_3C_6H_5O_7$	513	sp. s.	sp. s.	
" Fluoride	AgFl	127	v. s.	v. s.	v. s.
" Iodide	AgI	235	n. s.	n. s.	same as Chloride.
" Nitrate	$AgNO_3$	170	1	.5	sp. s.
" Nitrite	$AgNO_2$	154	300	dec.	n. s.
" Oxalate	$Ag_2C_2O_4$	304	sp. s.	s.	n. s.
" Oxide	Ag_2O	232	n. s.	n. s.	n. s.
" Sulphide	Ag_2S	248	n. s.	n. s.	n. s.
Soda, Caustic (see Sodium Hydrate)					
Sodium Acetate	$NaC_2H_3O_2,6H_2O$	190	3	.66	n. s.
" Biborate (Borax)	$Na_2B_4O_7,10H_2O$	382	12.5	2	n. s.
" Bromide	NaBr	103	1.25	1	1:16
" Bicarbonate	$NaHCO_3$	84	12	dec.	n. s.
" Carbonate	$Na_2CO_3,10H_2O$	286	2	1	n. s.
" Chloride	NaCl	58.5	2.75	2.75	n. s.
" Citrate	$Na_3C_6H_5O_7$	258	1	.5	sp. s.
" Hydrate	NaHO	40	1 5	.5	sp. s.
" Hypo-sulphite	$Na_2S_2O_35H_2O$	248	1.5	1	sp. s.
" Iodide	NaI	150	.5	.3	sp. s.
" Nitrate (see Chili Saltpetre)	$NaNO_3$	85	1.36	1	1 in 37
" Sulph-antimoniate	$NaSbS_3$	241	s.	s.	n. s.
" Sulphate	$Na_2SO_4,10H_2O$	322	2	4	s.
" Sulphide	$Na_2S.9H_2O$	240	s.	s.	sp. s.

TABLE OF SYMBOLS, MOLECULAR WEIGHT AND SOLUBILITIES OF THE PRINCIPAL CHEMICALS USED IN PHOTOGRAPHY.

Abbreviations.—s., soluble; v. s., very soluble; sp. s., sparingly soluble; n. s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water.	Alcohol.
Sodium Sulphite	$Na_2SO_3,7H_2O$	252	4	2	sp. s.
" Thio-sulphate (see Hypo-sulphite)					
Strontium, Bromide	$SrBr_2,6H_2O$	355.5	1	.75	sp. s.
" Chloride	$SrCl_2,6H_2O$	266.5	1.8	1	sp. s.
" Nitrate	$Sr(NO_3)_2$	211.5	5	2	sp. s.
Sugar of Lead (see Lead Acetate					
Sulphate Soda (see Sodium Sulphate)					
Tannin (see Digallic Acid)					
Thymol	$C_6H_3(CH_3(C_3H_7)COO$	177	sp.		& in ether.
Tin, Chloride (Stannic)	$SnCl_4$	260	dec.	in much	water.
" Chloride (Stannous)	$SnCl_2.2H_2O$	225	135:100	655:100	v. s.
Uranium, Bromide	$UBr_2.4H_2O$	352	1	.5	sp. s.
" Nitrate	$UO_2(NO_3)_2, 6H_2O$	384	.5	.25	v. s.
" Sulphate	$UO_2(SO_4),3H_2O$	302	.5	.25	v. s.
Verdigris (see Copper Acetate)					
Vitriol, Blue (see Copper Sulphate)					
" Green (see Iron Sulphate)					
" White (see Zinc Sulphate)					
Washing Soda (see Sodium Carbonate)					
Wood Alcohol (see Alcohol Methyl)					
Zinc, Bromide	$ZnBr_2$	225	del.	and e. s.	s.
" Chloride	$ZnCl_2$	136	.33		s.
" Iodide	ZnI_2	319	.33	dec.	v. s.
" Nitrate	$Zn'NO_3)_2,6H_2O$	296	del.	del.	del.
" Sulphate (see White Vitriol)	$ZnSO_4,7H_2O$	287	135:100	655:100	n. s.

TABLE SHOWING COMPARATIVE VALUE OF ALKALINE CARBONATES IN DEVELOPERS.

O. G. MASON.

Commercial Name.	Chemical Symbol.	Molecular Weight.	The Commercial Salt contains of the pure Salt about	100 parts of 36 per cent Acetic Acid Require for Saturation.	Solubility in Water (approximate).
Soda, Caustic	NaHO	40	80 to 92%	26.66 p'rts of 90% Soda	1 part in 2
Sodium Carbonate, Carbonate of Soda, Sal Soda, Crystals,	$Na_2CO_3.10H_2O$	286	96 to 98%	89.38 " 96% "	1 " 2
The same, anhydrous or in dry powder	Na_2CO_3	106	About 98 to 99%	89.38 of 98 to 99% dry Sal Soda.	1 " 6
Sodium Bicarbonate, Bicarbonate of Soda, "Sesqui-carbonate of Soda,"	$NaHCO_3$	84	98 to 100%	50.91 of 99% Bicarb. Soda.	1 " 12

Equal work is done by 80 parts of Caustic Soda, 286 parts of Sal Soda (crystals), 106 parts of Sal Soda (dry), 168 parts of Bicarbonate of Soda. These quantities must be increased to make up for any impurity contained in the sample being used; for this purpose the usual percentage of impurity given in the above table may be assumed for all ordinary photographical uses.

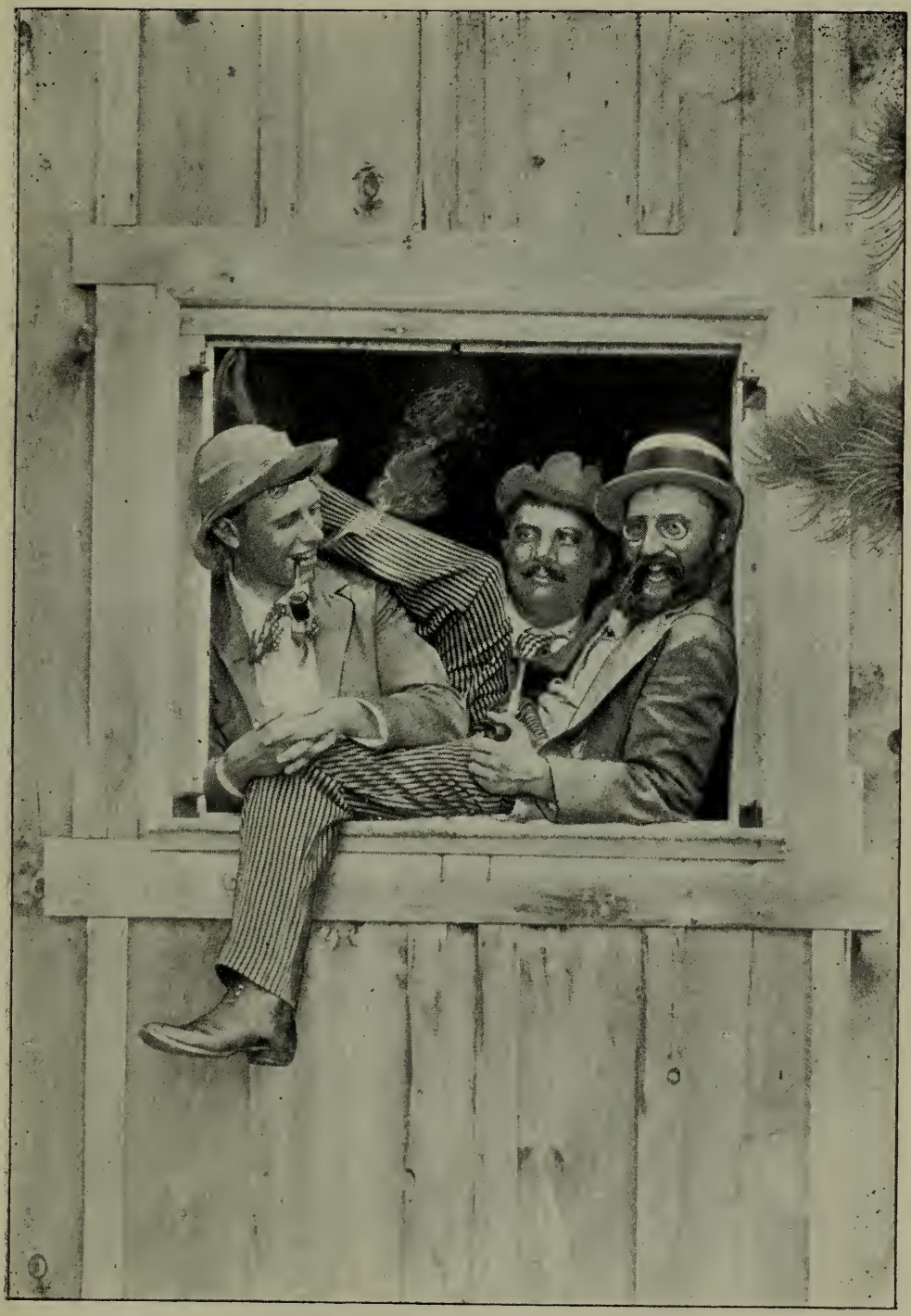
Potassa (Caustic Potash)	KHO	56	80 to 95%	37.33 parts of 90% Potassa.	1 part in 1
Potassium Carbonate, Carbonate of Potassa, Sal Tartar, Saleratus,	$K_2CO_3.1\frac{1}{2}H_2O$	165	76 to 96% Usually about 81%	51.11 parts of 81% Carb. Potassa.	1 " 1
Potassium, Carbonate, dry	K_2CO_3	140	About 95%	122.74 parts of 95% Carb. Potassa.	1 " 1
Potassium Bicarbonate, Bicarbonate of Potassa,	$KHCO_3$	100	100%	60 parts of 100% Bicarb. Potassa.	1 " 4

Equal work is done by 112 parts Caustic Potassa, 165 parts (about) ordinary Carbonate Potassa, 200 parts of Bicarbonate Potassa. These quantities must be increased in proportion to impurities, as noted in case of Soda These two alkalies are interchangeable for doing the same amount of work when *pure*, and when the one named in a given formula can not be obtained the table may assist in choosing a substitute of proper strength and solubility.

Dry or anhydrous Carbonate of Potassium is not usually found in the market.

IMPURITIES IN PHOTOGRAPHIC CHEMICALS AND TESTS FOR THEM.

Substance.	Impurities Possibly Present.	Tests.
Ammonia	Carbonic Acid.	Renders lime-water milky.
	Dissolved solid matter	Residue left on evaporation.
	Chlorides.	After acidulating with nitric acid, it gives a precipitate with silver nitrate, which, after washing, is readily soluble in ammonia, and re-precipitated by nitric acid.
	Sulphates.	After acidulating with nitric acid, it gives a precipitate with barium nitrate.
	Lime.	A white precipitate with oxalate of ammonium.
	Lead is often present, derived from the action upon flint glass bottles.	Black precipitate with sulphuretted hydrogen.
Nitric Acid	Traces of sulphuric acid.	After dilution it gives a precipitate with barium nitrate.
	Chlorides.	After dilution it gives a precipitate with silver nitrate.
	Peroxide of nitrogen.	The acid is yellow.
	Iodine may be present if the acid be prepared from sodium nitrate.	After dilution and cooling it gives a blue color with starch paste or mucilage.
Hydrochloric Acid	Free chlorine.	Liberates iodine from solution of potassium iodide. See also chlorides, nitric acid.
	Sulphuric acid.	As above for nitric acid.
	Perchloride of iron.	Yellow color. Brown precipitate with ammonia added till it smells slightly.
Hydrochloric Acid	Arsenic.	Marsh's test.
	Some yellow samples contain no iron, but an organic salt, and give an alkaline ash on ignition of the residue after evaporation.	Reinsh's test; a small piece of copper foil becomes coated on boiling in dilute acid.
Sulphuric Acid	Bisulphate of potassium.	Residue on evaporation.
	Sulphate of lead.	Milkiness on dilution. May be completely freed from lead by diluting with three or four times as much water, and allowing to settle.
	When sold as pure, it invariably contains a trace of iron. Common acid is also liable to contain arsenic, selenium, thallium, and many other substances.	No easy test can be given, as the substances are so numerous; some of them volatile, and most require separation from the acid before detection.
	Organic matter, as a piece of straw in a carboy of acid.	Gives a brown color to the acid.
Acetic Acid	Water.	Does not solidify when cooled to 17° C, (53° F.)
	Sulphurous and hydrochloric acids.	White precipitate with silver nitrate.
	Aldehyde, or volatile tarry matter.	Blackens in the light after adding silver nitrate.
	Organic sulphuric acid.	Smell of garlic.
Citric Acid	Tartaric acid.	Strong solution of potassium acetate added to a strong solution of the acid will deposit white crystalline bitartrate.
Pyrogallic Acid	Metagallic acid.	Black residue insoluble in water.
Silver Nitrate	Free nitric acid.	Reddens litmus paper (neutral silver nitrate does not affect litmus).
Potassium Carbonate	Chlorides and sulphates.	Same as for ammonia.
Potassium Iodide	Potassium carbonate.	A strong solution is alkaline to test paper.
	Sulphates and chlorides.	Same as for ammonia.
	Potassium iodate.	A pretty strong solution becomes yellow from liberation of iodine on addition of dilute sulphuric acid, or better, a strong solution of citric acid.



D. F. Fairchild, Photo. Stevens & Morris, Engravers.

THREE OF A KIND.

IMPURITIES IN PHOTOGRAPHIC CHEMICALS AND TESTS FOR THEM.—*Continued.*

Substance.	Impurities Possibly Present.	Test.
Potassium Bromide	Similar to potassium iodide.	See potassium iodide.
Sodium Carbonate	Chlorides and sulphates.	Same as for ammonia.
Sodium Chloride	Chloride of calcium.	Oxalate of ammonium (after addition of a little acetic acid) gives a milkiness or precipitate, indicating calcium; filter this out, and add ammonia, chloride of ammonium, and phosphate of sodium (clear solutions). A precipitate indicates magnesium. Both the above cause dampness in wet weather.
	Chloride of magnesium.	
	Sodium sulphate.	As for sulphates in ammonia.
Potassium Cyanide	Potassium carbonate nearly always present.	Effervescence with dilute acids, giving off a gas carbonic anhydride, which renders lime water turbid.
Potassium Hydrate		
Kaolin	Chalk.	Effervescence with dilute acids.
Water	Sulphates and chlorides.	Same as for ammonia.
	Calcium carbonate, temporary hardness.	Deposited by boiling.
	Ammonia, almost always present in distilled and rain water.	Test as for calcium chloride, see sodium chloride.
		Brown coloration, or precipitate with Nessler's re-agent.
Gelatine	Alum.	Ash, sometimes as much as 10 per cent.
	Fatty matter.	Separated by precipitation with alcohol. Dissolved out by ether or benzine, and left as a residue on evaporation of the solvent.
Ammonium Bromide	Potassium bromide, or other non-volatile bodies.	Leaves a residue when heated.
	Ammonium chloride.	Same as for chlorides in ammonia.
Pyrogallic Acid	Powdered glass.	Left behind on solution.
Potassium Iodide	Potassium bromide.	The crystals of bromide are usually more transparent than those of iodide, but no reliance can be placed on this.
Silver Nitrate	Potassium nitrate, sometimes present in the fused sticks, not in the crystals.	Will not yield the full quantity of chloride on precipitation with HCl. Gives a purple color to flame.
Calcium Chloride	Calcium hydrate.	The clear filtered solution made with distilled water is alkaline to test paper, and gives a precipitate on breathing into it through a tube.
Pure Chemicals generally.	Broken glass, bits of straw, wood, paper, &c.	These impurities either float or sink on the solution, and may easily be seen.

COMPARISON OF EIKONOGEN DEVELOPERS FOR RAPID EXPOSURES.

REDUCED TO ONE OUNCE OF PREPARED DEVELOPER.

By C. W. GRANT.

No.	Water.	Eiko.	Sulph. Sodium.	Carb. Pot.	Remarks.
	1 oz.	Grs.	Grs.	Grs.	
1	480 m.	7.3	43.7	10.9	*American Amateur Photographer*, Aug. 1890, p. 303.
2	"	8.3	22	11	By Seed Dry Plate Co. *
3	"	5.5	11	11	" Cramer Dry Plate Co. *
4	"	16	64	16	" Harvard " " *
5	"	16	32	16	" Gottheil. AM. ANN., 1890, p. 269.‡‡
6	"	6	30	12A	" W. H. Rau.† AM. ANN., 1890, p. 225.
7	"	12	32	12	" Allen & Rowell.††
8	"	6	24	16	" Eagle D. P. Works.
9	"	6	12	9B	" U. S. Supply Co.
10	"	12	24	8	" John Nicol.** AM. ANN., 1890, p. 41.
11	"	6	28	9C	" F. C. Beach.‡
12	"	5	30	5	" *Photo. Times.****
					" Chautauqua School.
Totals.	5760	106.1	352.7	135.9	Divide by 12—Equals Average.
No. 1	480 m.	8.8	29.4	11.3	Average.
No. 2	480 m.	9.5	29.4	12.2	Average, Nos. 1 to 10 inclusive.
.....	480 m.	12	32	12	Recommended.

Allen & Rowell furnished the following formula for use with their slide plates, and can attest its efficiency, and I use it exclusively for slides and bromide prints, but substitute carb. pot. for c. soda.

Water to make	1 ounce
Sulph. Soda (cryst.)	18 grains
Eiko	3 grains
Quinol	3 grains
Carb. Soda	18 grains
Carb. Lithium	3 grains

* These were taken from an article by Mr. F. C. Beach.

‡‡ Herr Gottheil gives Carb. Pot. (as above) for rapid exposures.

† Mr. Rau considers Eiko. with Carb. *Soda*, inferior to Pyro.

‡ Mr. Beach considers Carb. Pot. more powerful than Carb. Soda, and less liable to cause stains. Confirmed by Gottheil, Rau, Nos. 1, 2, 3, 4, 5, 7, 8, 10, 12, and by compiler.

††—A. Given as 24 grs. Carb. Soda.

***—C. Given as 17 grs. Carb. Soda. Not stated if for rapid exposures.

**—B. Given as 9 grs. Carb. Soda.

TABLE OF EXPOSURES.

By H. L. Ide.

INTENDED for use with Carbutt's Special Sensitometer 25 Plates. The table being prepared from the diagram of comparative exposures published on page 308 of '92 TIMES ANNUAL and intended to be used in connection with this diagram for ascertaining the exposure in other months of the year.

HOURS. Morning. / Evening.		5 / 7					6 / 6					7 / 5					8 / 4					9 / 3					10 / 2	11 / 1	12 / 12	Noon / Afternoon	MONTH, JULY.		
Near view, with foliage or dark objects or shadows in foreground Portraits and living objects out of doors.	1	1/5	3/8	1/2	3/4	1	1/20	1/10	1/8	1/5	1/4	1/40	1/20	1/16	1/10	1/8	1/64	1/32	1/20	1/16	1/10	1/72	1/36	1/24	1/18	1/12	1/80	1/40	1/32	1/16	1/16	2	Near view, light colored buildings or bright objects in foreground. Near view, with long distance street scenes.
	2	3/8	3/4	1	1½	2	1/10	1/5	1/4	3/8	1/2	1/20	1/10	1/8	1/5	1/4	1/32	1/16	1/10	1/8	1/5	1/36	1/18	1/12	1/9	1/6	1/40	1/20	1/16	1/10	1/8	4	
	4	3/4	1½	2	3	4	1/5	3/8	1/2	3/4	1	1/16	1/8	1/5	1/4	3/8	1/16	1/8	1/5	1/4	3/8	1/18	1/9	1/6	2/9	1/3	1/20	1/10	1/8	1/5	1/4	8	
	8	1½	3	4	6	8	3/8	3/4	1	1½	2	1/5	3/8	1/2	3/4	1	1/8	1/4	3/8	1/2	3/4	1/9	2/9	1/3	4/9	3/5	1/10	1/5	1/4	3/8	1/2	16	
	16	3	6	8	12	16	3/4	1½	2	3	4	2/8	3/4	1	1½	2	1/4	1/2	3/4	1	1½	2/9	4/9	3/5	7/8	1⅕	1/5	3/8	1/2	3/4	1	32	
	32	6	12	16	24	32	1½	3	4	6	8	3/4	1½	2	3	4	1/2	1	1½	2	3	4/9	7/8	1⅕	1¾	2⅜	3/8	3/4	1	1½	2	64	
	64	12	24	32	48	64	3	6	8	12	16	1½	3	4	6	8	1	2	3	4	6	7/8	1⅛	2⅜	3½	4¾	3/4	1½	2	3	4	128	
	128	24	48	64	96	128	6	12	16	24	32	3	6	8	12	16	2	4	6	8	12	1⅛	3½	4¾	7	9½	1½	3	4	6	8	256	
Distant view, no near foreground.	2	1/10	1/5	1/4	3/8	1/2	1/40	1/20	1/16	1/10	1/8	1/80	1/40	1/32	1/20	1/16	1/128	1/72	1/40	1/32	1/20	1/144	1/72	1/48	1/36	1/24	1/160	1/80	1/64	1/40	1/32	8	Sea and sky.
	4	1/5	3/8	1/2	3/4	1	1/20	1/10	1/8	1/5	1/4	1/40	1/20	1/16	1/10	1/8	1/64	1/32	1/20	1/16	1/10	1/72	1/36	1/24	1/18	1/12	1/80	1/40	1/32	1/20	1/16	16	
	8	3/8	3/4	1	1½	2	1/10	1/5	1/4	3/8	1/2	1/20	1/10	1/8	1/5	1/4	1/32	1/16	1/10	1/8	1/5	1/36	1/18	1/12	1/9	1/6	1/40	1/20	1/16	1/10	1/8	32	
	16	3/4	1½	2	3	4	1/5	3/8	1/2	3/4	1	1/10	1/5	1/4	3/8	1/2	1/16	1/8	1/5	1/4	3/8	1/18	1/9	1/6	2/9	1/3	1/20	1/10	1/8	1/5	1/4	64	
	32	1½	3	4	6	8	3/8	3/4	1	1½	2	1/5	3/8	1/2	3/4	1	1/8	1/4	3/8	1/2	3/4	1/9	2/9	1/3	4/9	3/5	1/10	1/5	1/4	3/8	1/2	128	
	64	3	6	8	12	16	3/4	1½	2	3	4	3/8	3/4	1	1½	2	1/4	1/2	3/4	1	1½	2/9	4/9	3/5	7/8	1⅕	1/5	3/8	1/2	3/4	1	256	
	128	6	12	16	24	32	1½	3	4	6	8	3/4	1½	2	3	4	1/2	1	1½	2	3	4/9	7/8	1⅕	1¾	2⅜	3/8	3/4	1/2	1½	2		
REMARKS.	U. S. Stop Number.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	U. S. Stop Number.	REMARKS.

TABLE INDICATING THE DISTANCE AT WHICH THE DEPTH OF FOCUS BECOMES INFINITE.

Focal Distance in Centimetres.	Relation of Lighting.											
	$\frac{f}{5}$	$\frac{f}{10}$	$\frac{f}{15}$	$\frac{f}{20}$	$\frac{f}{25}$	$\frac{f}{30}$	$\frac{f}{35}$	$\frac{f}{40}$	$\frac{f}{45}$	$\frac{f}{50}$	$\frac{f}{55}$	$\frac{f}{60}$
5..... ..	2.5	1.3	0 9	0.7	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3
10.....	10.0	5.0	3.4	2.5	2.0	1.7	1.5	1.3	1.2	1.0	0.9	0 9
15.....	22.5	11.3	7.5	5.7	4.5	3.8	3.3	2.9	2.5	2.3	2.1	1.9
20.....	40.0	20.0	13.4	10.0	8.0	6.7	5.8	5.0	4.5	4.0	3.7	3.4
25.....	62.5	31.3	20.9	15.7	12.5	10.5	9.0	7.9	7.0	6.3	5.7	5.3
30.....	90.0	45.0	30.0	22.5	18.0	15.0	12.9	11.3	10.0	9.0	8.2	7.5
35	122 5	61.3	40.9	30.7	22.5	20.5	17.5	15.4	13.6	12.3	11.2	10.3
40.....	160.0	80.0	53.4	40.0	32.0	26.7	22.9	20.0	17.8	16.0	14.6	13.4
45..... .	202 5	101.3	67.5	50.7	40.5	33.8	29.0	25.4	22.5	20.3	18.4	16.9
50.....	250	125.0	83.4	62.5	50.0	41.7	35.8	31.3	27.8	25.0	22.8	20.9

To find the distance of the nearest object beyond which everything is in focus with a lens of O^m 15 of focus; with a diaphragm of which the relation of lighting is $f/20$ we search in the horizontal line this relation and looking in this column we find opposite the figure 15, indicating the focal distance, the figure 5.7 or 5^m 70 for the distance from which all the points situated further on will give a sharp image on the ground-glass.

If the focal distance is not found in the table, or if the relation of lighting is not given exactly as on the diaphragm, one can use the following formula which gives the same result:

$$P^p = \frac{F^2}{n \times 2.}$$

That is to say, to know the depth posterior to p^p of the focus, raise to the square the focal length F, and divide the square by the denominator of the fraction indicating the diaphragm n multiplied by 2; for example, for the case above cited:

$$\frac{15^2}{20 \times 2} = \frac{225}{40} = 5.60, \text{ hence } 5^m60.$$

One sees that this second method gives very nearly the same result, and a result accurate enough in practice.

TABLE OF EQUIVALENT QUANTITIES OF SOME HALOIDS USED IN PHOTOGRAPHY.

CALCULATED FOR THE ANHYDROUS AND DRY SALTS.

By A. B. AUBERT, Professor of Chemistry, Maine State College, Orono, Me.

†EQUIVALENT QUANTITIES OF VARIOUS CHLORIDES USED IN PHOTOGRAPHY.

Sodium Chloride.	Potassium Chloride.	Ammonium Chloride.	Lithium Chloride.	Cadmium Chloride.
1	1.275	0.914	0.726	1.564
0.784	1	0.717	0.569	1 226
1.093	1.394	1	0.794	1.710
1.376	1.755	1.258	1	2.152
0.639	0 818	0.584	0.464	1

†EQUIVALENT QUANTITIES OF VARIOUS BROMIDES USED IN PHOTOGRAPHY.

Bromine.	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide + 4 Equi. Water.	Zinc Bromide.
1	1.225	1.488	1.287	2.150	1.406
0.816	1	1.214	1.055	1.754	1.147
0.672	0.823	1	0.865	1.445	0.945
0.777	0.952	1.156	1	1.671	1.092
0.465	0.570	0.692	0.599	1	0.654
0.711	0.871	1 058	0.915	1.529	1

†EQUIVALENT QUANTITIES OF VARIOUS IODIDES USED IN PHOTOGRAPHY.

Iodine.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.	Zinc Iodide.
1	1.142	1.307	1.181	1.491	1.255
0.876	1	1.145	1.035	1.262	1.099
0.765	0.874	1	0.903	1.102	0.960
0.847	0.967	1.107	1	1.220	1.063
0.694	0.793	0.907	0.820	1	0.871
0.797	0.910	1.042	0.941	1.148	1

†EQUIVALENT QUANTITIES OF VARIOUS SILVER SALTS USED IN PHOTOGRAPHY.

Silver (Metallic).	Nitrate.	Chloride.	Bromide.	Iodide.
1	1.574	1.328	1.741	2.176
0.6353	1	0.844	1.106	1.382
0.7523	1.184	1	1.310	1.638
0.5741	0.904	0.763	1	1.250
0.4595	0.723	0.610	0.800	1

†EQUIVALENT QUANTITES OF VARIOUS GOLD SALTS USED IN PHOTOGRAPHY.

Gold (Metallic).	Chloride.	Double Chloride of Gold and Potassium.	Double Chloride of Gold and Sodium.
1	1.542	2.1048	2.0229
0.6485	1	1.3645	1.3119
0.4751	0.7326	1	0.9611
0.4943	0.7623	1.0405	1

† Translated and partly recalculated from the "Agenda du Chimiste."

ACKLAND'S TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

No. 1.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$.	Weight of silver haloid produced by one grain of soluble haloid.	Weight of soluble haloid required to produce one grain of silver haloid.	Weight of silver haloid produced from one grain $AgNO_3$.
Ammonium bromide.....	98	1.734	.576	1.918	.521	
Potassium "	119.1	1.427	.700	1.578	.633	
Sodium "	103	1.650	.606	1.825	.548	1.106
Cadmium " com. ..	172	.988	1.012	1.093	.915	
" " anh....	136	1.25	.800	1.382	.723	
Zinc "	112.1	1.509	.663	1.670	.600	
Ammonium chloride.....	53.5	3.177	.315	2.682	.373	.844
Sodium "	58.5	2.906	.344	2.453	.408	
Ammonium iodide.....	145	1.172	.853	1.620	.617	
Potassium "	166.1	1.023	.977	1.415	.707	1.382
Sodium "	150	1.133	.882	1.566	.638	
Cadmium "	183	.929	1.076	1.284	.778	

Table No. 1 presents the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of another.

In order to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows :

Bromide of potassium..... 150 grains.
Iodide of potassium..... 10 "
Chloride of ammonium..... 10 "
Gelatine.....200 "

we want to know how much silver nitrate should be employed in sensitizing this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum :

Potassium bromide.....150 × 1.427 = 214
" iodide..... 10 × 1.023 = 10.23
Chloride of ammonium..... 10 × 3.177 = 31.77
} Weight silver nitrate required.

or the total quantity of silver nitrate required for full conversion, 256.00 grains.

ELSDEN'S TABLE OF POISONS AND ANTIDOTES.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidote.
Caustic Vegetable Acids.	Oxalic Acid. including Potassium Oxalate.	1 dram is the smallest fatal dose known.	Hot, burning sensation in throat and stomach; vomiting, cramps, and numbness.	Chalk, whiting or magnesia, suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies.	Ammonia. Potash. Soda.	Vapor of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth, and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts.	Mercuric Chloride.	3 grains the smallest known fatal dose.	Acrid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	Acetate of Lead.	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	Cyanide of Potassium.	*a*. Taken internally, 3 grs. fatal.	Insensibility, slow, gasping respiration, dilated pupils, and spasmodic closure of the jaws.	No certain remedy; cold affusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	Bichromate of Potassium	*a*. Taken internally.	Irritant pain in stomach, and vomiting.	Emetics and magnesia, or chalk.
		b. Applied to slight abrasions of the skin.	Produces troublesome sores and ulcers.	
	Nitrate of Silver.		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids.	Nitric Acid.	2 drams have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk, plaster of the apartment beaten up in water.
	Hydrochloric Acid.	½ ounce has caused death.		
	Sulphuric Acid.	1 dram has been fatal.		
	Acetic Acid, concentrated, has as powerful an effect as the mineral acids.			
	Iodine.	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrowroot and starch given freely.
	Ether.	When inhaled.	Effects similar to chloroform.	Cold affusion and artificial respiration.
	Pyrogallol.	2 grains sufficient to kill a dog.	Resemble phosphorus poisoning.	No certain remedy. Speedy emetic desirable.

UNITED STATES WEIGHTS AND MEASURES.

ACCORDING TO EXISTING STANDARDS.

LINEAL.

	Inches.	Feet.	Yards.	Rods.	Fur's.	Mile.
12 inches = 1 foot.	12 =	1				
3 feet = 1 yard.	36 =	3 =	1			
5.5 yards = 1 rod.	198 =	16.5 =	5.5 =	1		
40 rods = 1 furlong.	7,920 =	660 =	220 =	40 =	1	
8 furlongs = 1 mile.	63,360 =	5,280 =	1,760 =	320 =	8 =	1

SURFACE—LAND.

	Feet.	Yards.	Rods.	Roods.	Acres.
144 sq. ins. = 1 sq. ft.					
9 sq. ft. = 1 sq. yard.	9 =	1			
30.25 sq. yds. = 1 sq. rod.	272.25 =	30.25 =	1		
40 sq. rods = 1 sq. rood.	10,890 =	1,210 =	40 =	1	
4 sq. roods = 1 acre.	43,560 =	4,840 =	160 =	4 =	1
640 acres = 1 sq. mile.	27,878,400 =	3,097,600 =	102,400 =	2,560 =	640

VOLUME—LIQUID.

4 gills = 1 pint.
2 pints = 1 quart.
4 quarts = 1 gallon.

Gills.	Pints.	Gallon.	Cub. In.
32 =	8 =	1 =	231

FLUID.

Gallon.	Pints.	Ounces.	Drachms.	Minims.	Cubic Centimetres.
1 =	8 =	128 =	1,024 =	61,440 =	3,785,435
	1 =	16 =	128 =	7,680 =	473,179
		1 =	8 =	480 =	29,574
			1 =	60 =	3,697

16 ounces, or a pint, is sometimes called a fluid pound.

TROY WEIGHT.

Pound.	Ounces.	Pennyweights.	Grains.	Grams.
1 =	12 =	240 =	5,760 =	373.24
	1 =	20 =	480 =	31.10
		1 =	24 =	1.56

APOTHECARIES' WEIGHT.

lb. Pound.	℥ Ounces.	ʒ Drachms.	℈ Scruples.	gr. Grains.	Grams.
1 =	12 =	96 =	288 =	5,760 =	373.24
	1 =	8 =	24 =	480 =	31.10
		1 =	3 =	60 =	3.89
			1 =	20 =	1.30
				1 =	.06

The pound, ounce, and grain are the same as in Troy weight.

AVOIRDUPOIS WEIGHT.

Pound.	Ounces.	Drachms.	Grains (Troy).	Grams.
1 =	16 =	256 =	7,000 =	453.60
	1 =	16 =	437.5 =	28.35
		1 =	27.34 =	1.77

ENGLISH WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT.

20 Grains = 1 Scruple = 20 Grains.
3 Scruples = 1 Drachm = 60 Grains.
8 Drachms = 1 Ounce = 480 Grains.
12 Ounces = 1 Pound = 5760 Grains.

FLUID MEASURE.

60 Minims = 1 Fluid Drachm
8 Drachms= 1 Fluid Ounce.
20 Ounces = 1 Pint.
8 Pints = 1 Gallon.

The above weights are usually adopted in formulas.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT.

$27\frac{11}{32}$ Grains = 1 Drachm= $27\frac{11}{32}$ Grains.
16 Drachms= 1 Ounce = $437\frac{1}{2}$ Grains.
16 Ounces = 1 Pound = 7000 Grains.

Precious Metals are usually sold by

TROY WEIGHT.

24 Grains = 1 Pennyweight = 24 Grains.
20 Pennyweights = 1 Ounce = 480 Grains.
12 Ounces = 1 Pound = 5760 Grains.

NOTE.—An ounce of metallic silver contains 480 grains, but an ounce of nitrate of silver contains only $437\frac{1}{2}$ grains.

UNITED STATES FLUID MEASURE.

Gal.		Pints.		Ounces.		Drachms.		Mins.		Cub. In.		Grains.		Cub. C.M.
1	=	8	=	128	=	1,024	=	61,440	=	231.	=	58,328.886	=	3,785.44
		1	=	16	=	128	=	7,680	=	28.875	=	7,291.1107	=	473.18
				1	=	8	=	480	=	1.8047	=	455.6944	=	29.57
						1	=	60	=	0.2256	=	56.9618	=	3.70

IMPERIAL BRITISH FLUID MEASURE.

Gal.		Pints.		Ounces.		Drachms.		Mins.		Cub. In.		Grains.		Cub. C.M.
1	=	8	=	160	=	1,280	=	76,800	=	277.27384	=	70,000	=	4,543.732
		1	=	20	=	160	=	9,600	=	34.65923	=	8,750	=	567.966
				1	=	8	=	480	=	1.73296	=	437.5	=	28.398
						1	=	60	=	0.21662	=	54.69	=	3.550

METRIC SYSTEM OF WEIGHTS AND MEASURES.

MEASURES OF LENGTH.

Denominations and Values.		Equivalents in Use.
Myriameter	10,000 meters.	6.2137 miles.
Kilometer	1,000 meters.	.62137 mile, or 3,280 ft. 10 ins.
Hectometer	100 meters.	328. feet and 1 inch.
Dekameter	10 meters.	393.7 inches.
Meter	1 meter.	39.37 inches.
Decimeter	1-10th of a meter.	3.937 inches.
Centimeter	1-100th of a meter.	.3937 inch.
Millimeter	1-1000th of a meter.	.0394 inch.

MEASURES OF SURFACE.

Denominations and Values.		Equivalents in Use.
Hectare	10,000 square meters.	2.471 acres.
Are	100 square meters.	119.6 square yards.
Centare	1 square meter.	1,550. square inches.

MEASURES OF VOLUME.

Denominations and Values.			Equivalents in Use.	
Names.	No. of Liters.	Cubic Measures.	Dry Measure.	Wine Measure.
Kiloliter or stere	1,000	1 cubic meter.	1.308 cubic yards.	264.17 gallons.
Hectoliter	100	1-10th cubic meter.	2 bu. and 3.35 pecks.	26.417 gallons.
Dekaliter	10	10 cubic decimeters.	9.08 quarts.	2.6417 gallons.
Liter	1	1 cubic decimeter.	.908 quart.	1.0567 quarts.
Deciliter	1-10	1-10th cubic decimeter.	6.1023 cubic inches.	.845 gill.
Centiliter	1-100	10 cubic centimeters.	.6102 cubic inch.	.338 fluid oz,
Milliliter	1-1000	1 cubic centimeter.	.061 cubic inch.	.27 fl. drm.

WEIGHTS.

Denominations and Values.			Equivalents in Use.
Names.	Number of Grams.	Weight of Volume of Water at its Maximum Density.	Avoirdupois Weight.
Millier or Tonneau	1,000,000	1 cubic meter.	2204.6 pounds.
Quintal	100,000	1 hectoliter.	220.46 pounds.
Myriagram	10,000	10 liters.	22.046 pounds.
Kilogram or Kilo	1,000	1 liter.	2.2046 pounds.
Hectogram	100	1 deciliter.	3.5274 ounces.
Dekagram	10	10 cubic centimeters.	.3527 ounce.
Gram	1	1 cubic centimeter.	15.432 grains.
Decigram	1-10	1-10th of a cubic centimeter.	1.5432 grain.
Centigram	1-100	10 cubic millimeters.	.1543 grain.
Milligram	1-1000	1 cubic millimeter.	.0154 grain.

For measuring surfaces, the square dekameter is used under the term of ARE; the hectare, or 100 ares, is equal to about 2½ acres. *The unit of capacity* is the cubic decimeter or LITER, and the series of measures is formed in the same way as in the case of the table of lengths. The cubic meter is the unit of measure for solid bodies, and is termed STERE. *The unit of weight* is the GRAM, which is the weight of one cubic centimeter of pure water weighed in a vacuum at the temperature of 4 deg. Cent. or 39.2 deg. Fahr., which is about its temperature of maximum density. In practice, the term cubic centimeter, abbreviated c.c, is generally used instead of milliliter, and cubic meter instead of kiloliter.

THE METRIC SYSTEM OF WEIGHTS AND MEASURES.

THE meter is a measure of length equal to 39.370 English or American inches, a standard of linear measure supposed to be the ten-millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of the meridian.

This system, formed on the meter as the unit of length, has four other leading units, all connected with and dependent upon this. Hence, we have:

1. The meter, which is the unit of measures of length.

2. The are, which is the unit of surface, and is the square of the meter.

3. The liter, which is the unit of measures of capacity, and is the cube of a tenth part of the meter.

4. The stere, which is the unit of measures of solidity, having the capacity of a cubic meter.

5. The gram, which is the unit of measures of weight, and is the weight of that quantity of distilled water at its maximum density, fills the cube of a hundredth part of the meter.

Each unit has its decimal multiples and sub-multiples, that is weights and measures ten times larger, or ten times smaller, than the principal units. The prefixes denoting multiples are derived from the Greek, and are: Deka, ten; hecto, hundred; kilo, thousand; and myria, ten thousand. Those denoting sub-multiples are taken from the Latin, and are: Deci, ten; centi, hundred (as in centigram or centimeter); and milli, thousand.

The metric system has been adopted by many nations, the English excepted. In America its use has been made optional, but is legalized by Congress. All photographic formulas received from the continent of Europe express values and quantities with metrical weights and measures. To utilize them directly without translating into the expressions of the English system, the student is advised to procure gram weights and cubic centimeter graduates, and substitute them for those denoting quantities according to the old plan.

As an assistance to those who cannot acquire these aids, we annex tables, which convert grams and cubic centimeters into English grains, drachms, and ounces sufficiently correct for practical purposes.

METRIC FLUID MEASURES.

The cubic centimeter, usually represented by "C.c.," is the unit of the metric measurement for liquids. It contains 17 minims of water. The weight of this quantity of water is 1 gram. The following table will prove to be sufficiently accurate for photographic purposes:

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH MEASURE.

1	cubic centimeter	=	17	minims.					
1	cubic centimeters	=	34	"					
3	"	=	51	"					
4	"	=	68	"	or	1	dram	8	minims.
5	"	=	85	"	"	1	"	25	"
6	"	=	101	"	"	1	"	41	"
7	"	=	118	"	"	1	"	58	"
8	"	=	135	"	"	2	drams	15	"
9	"	=	152	"	"	2	"	32	"
10	"	=	169	"	"	2	"	49	"
20	"	=	338	"	"	5	"	38	"
30	"	=	507	"	"	1	ounce	0 dram	27 minims
40	"	=	676	"	"	1	"	3 drams	16 "
50	"	=	845	"	"	1	"	6 "	5 "
60	"	=	1014	"	"	2	ounces	0 "	54 "
70	"	=	1183	"	"	2	"	3 "	43 "
80	"	=	1352	"	"	2	"	6 "	32 "
90	"	=	1521	"	"	3	"	1 "	21 "
100	"	=	1690	"	"	3	"	4 "	10 "
1000	"	=	1 liter = 34 fluid ounces nearly, or $2\frac{1}{8}$ pints.						

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH WEIGHT.

THE following table, which contains no error greater than one-tenth of a grain, will suffice for most practical purposes:

1	gram	=	$15\frac{2}{5}$	grains.					
2	grams	=	$30\frac{4}{5}$	"					
3	"	=	$46\frac{1}{5}$	"					
4	"	=	$61\frac{4}{5}$	"	 or	1	dram	$1\frac{4}{5}$	grain.
5	"	=	$77\frac{1}{5}$	"	 "	1	"	$17\frac{1}{5}$	grains.
6	"	=	$92\frac{3}{5}$	"	 "	1	"	$32\frac{3}{5}$	"
7	"	=	108	"	 "	1	"	48	"
8	"	=	$123\frac{2}{5}$	"	 "	2	drams	$3\frac{2}{5}$	"
9	"	=	$138\frac{4}{5}$	"	 "	2	"	$18\frac{4}{5}$	"
10	"	=	$154\frac{2}{5}$	"	 "	2	"	$34\frac{2}{5}$	"
11	"	=	$169\frac{4}{5}$	"	 "	2	"	$49\frac{4}{5}$	"
12	"	=	$185\frac{1}{5}$	"	 "	3	"	$5\frac{1}{5}$	"
13	"	=	$200\frac{3}{5}$	"	 "	3	"	$20\frac{3}{5}$	"
14	"	=	216	"	 "	3	"	36	"
15	"	=	$231\frac{2}{5}$	"	 "	3	"	$51\frac{2}{5}$	"
16	"	=	247	"	 "	4	"	7	"
17	"	=	$262\frac{2}{5}$	"	 "	4	"	$22\frac{2}{5}$	"
18	"	=	$277\frac{4}{5}$	"	 "	4	"	$37\frac{4}{5}$	"
19	"	=	$293\frac{1}{5}$	"	 "	4	"	$53\frac{1}{5}$	"
20	"	=	$308\frac{3}{5}$	"	 "	5	"	$8\frac{3}{5}$	"
30	"	=	463	"	 "	7	"	43	"
40	"	=	$617\frac{1}{5}$	"	 "	10	"	$17\frac{1}{5}$	"
50	"	=	$771\frac{2}{5}$	"	 "	12	"	$51\frac{3}{5}$	"
60	"	=	926	"	 "	15	"	26	"
70	"	=	$1080\frac{1}{5}$	"	 "	18	"	$0\frac{1}{5}$	"
80	"	=	$1234\frac{3}{5}$	"	 "	20	"	$34\frac{3}{5}$	"
90	"	=	1389	"	 "	23	"	9	"
100	"	=	$1543\frac{1}{5}$	"	 "	25	"	$43\frac{1}{5}$	"
1000	"	=	1 kilogram = 32 oz., 1 dr., $12\frac{2}{5}$ gr.						

THE CONVERSION OF METRIC INTO AMERICAN MEASURE.

By Nelson B. Sizer, B.Sc., M.D.

[From *The Photographic Times*, August 14, 1891.]

The following table is computed true to the nearest half grain or minim, as the case may be, so it will prove a sufficiently near approximation to the required metric equivalents.

U. S. P. Standard.

Gram, or c.cm.	Grains.	Minims.	Gram, or c.cm.	Grains.	Minims.
1	15½	16¼	15	231½	244
2	31	32½	16	247	260
3	46	49	17	262	276
4	62	65	18	278	292½
5	77	81	19	293	309
6	93	97½	20	308½	325
7	108	114	30	463	487½
8	123½	130	40	617	650
9	139	146	50	771½	813
10	154	162½	60	926	975½
11	170	179	70	1,080	1,138
12	185	194	80	1,234½	1,300½
13	201	211	90	1,389	1,463
14	216	227½	100	1,543	1,625½
..		.. .	1,000	15,432⅓	16,256⅓
..				1 kilo.	liter.

The "kilo" or kilogram, the 1,000 gram weight, is equal to 32 ounces $72\frac{2}{10}$ grains "Troy or Apothecaries" weight, or 2 pounds 3 ounces $119\frac{7}{10}$ grains Avoirdupois.

The "liter" or 1,000 cubic centimeters, or bulk of water that weighs 1 kilo, is equal to 2 pints 1 fluid ounce and $415\frac{3}{10}$ minims, U. S. P. Standard, or our glass graduates as commonly sold by reliable houses.

The grains and minims are easily reduced to fluid drachms and fluid ounces, or drachms and ounces Troy, by my readers, if they will only remember that 60 grains or minims go to the solid or fluid drachm, and 480 grains or minims, or 8 drachms solid or fluid, go to each U. S. P. ounce, solid or fluid.

Thus the table gives the value of 90 grams as 1,389 grains, of 90 cubic centimeters as 1,463 minims. How many ounces in each?

Dividing 1,389 by 60 for drachms, we have 23 drachms 9 grains. As 8 drachms go to the ounce, there are 2 ounces in the 23 drachms and 7 drachms over, so we have—in 1,389 grains there are 2 ounces 7 drachms 9 grains. In the same way we find 3 fluid ounces and 23 minims over, to be the value of 90 cubic centimeters or 1,463 minims.

TABLE SHOWING THE COMPARISON OF THE READINGS OF THERMOMETERS.

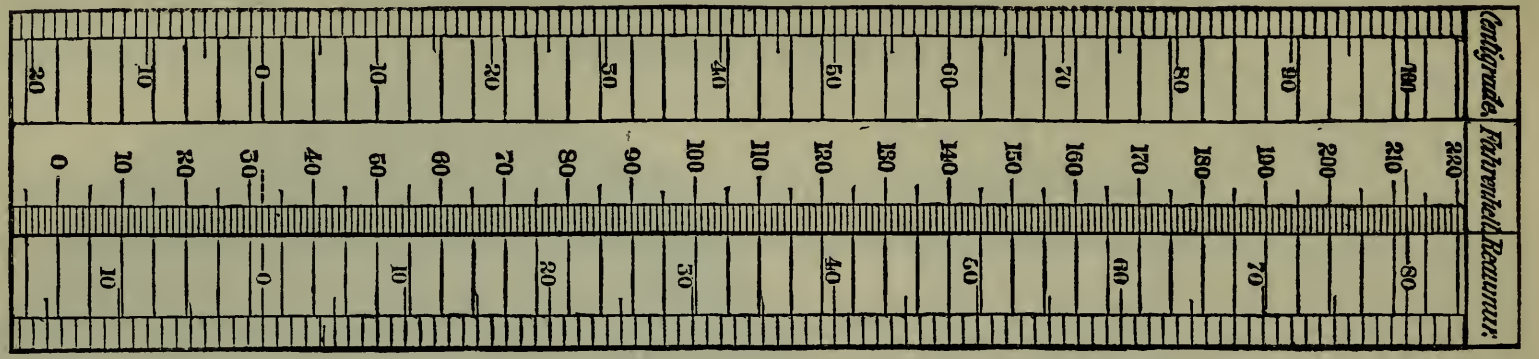
CELSIUS, OR CENTIGRADE (C). RÉAUMUR (R). FAHRENHEIT (F).

C.	R.	F.	C.	R.	F.
—30	—24.0	—22.0	23	18.4	73.4
—25	—20.0	—13.0	24	19.2	75.2
—20	—16.0	— 4.0	25	20.0	77.0
—15	—12.0	+ 5 0	26	20.8	78.8
—10	— 8.0	14.0	27	21.6	80.6
— 5	— 4.0	23.0	28	22.4	82 4
— 4	— 3.2	24.8	29	23 2	84.2
— 3	— 2.4	26.6	30	24.0	86.0
— 2	— 1.6	28.4	31	24.8	87.8
— 1	— 0.8	30.2	32	25.6	89.6
			33	26.4	91.4
Freezing point of water.			34	27.2	93.2
			35	28.0	95.0
0	0.0	32.0	36	28.8	96.8
1	0.8	33.8	37	29.6	98.6
2	1.6	35.6	38	30.4	100.4
3	2.4	37.4	39	31.2	102.2
4	3.2	39.2	40	32.0	104.0
5	4.0	41.0	41	32.8	105.8
6	4.8	42.8	42	33.6	107.6
7	5.6	44.6	43	34.4	109.4
8	6.4	46.4	44	35.2	111.2
9	7.2	48.2	45	36.0	113.0
10	8.0	50.0	50	40.0	122.0
11	8.8	51.8	55	44.0	131.0
12	9.6	53.6	60	48.0	140.0
13	10.4	55.4	65	52.0	149.0
14	11.2	57.2	70	56.0	158.0
15	12.0	59.0	75	60.0	167.0
16	12.8	60.8	80	64.0	176.0
17	13.6	62.6	85	68.0	185.0
18	14.4	64.4	90	72.0	194.0
19	15.2	66.2	95	76.0	203.0
20	16.0	68.0	100	80.0	212.0
21	16.8	69.8			
22	17.6	71.6	Boiling point of water.		

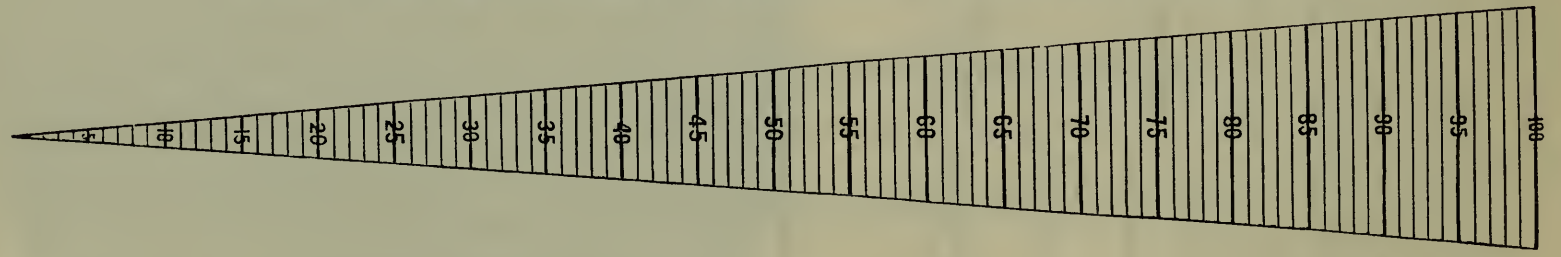
Readings on one scale can be changed into another by the following formulæ, in which $t°$ indicates degrees of temperature:

Réau. to Fahr.	Cent. to Fahr.	Fahr. to Cent.
$\frac{9}{4}t°\ \mathrm{R} + 32° = t°\ \mathrm{F}$	$\frac{9}{5}t°\ \mathrm{C} + 32° = t°\ \mathrm{F}$	$\frac{5}{9}\left(t°\ \mathrm{F} - 32°\right) = t°\ \mathrm{C}$
Réau. to Cent.	**Cent. to Réau.**	**Fahr. to Réau.**
$\frac{5}{4}t°\ \mathrm{R} = t°\ \mathrm{C}$	$\frac{4}{5}t°\ \mathrm{C} = t°\ \mathrm{R}$	$\frac{4}{9}\left(t°\ \mathrm{F} - 32\right) = t°\ \mathrm{R}$

THERMOMETER SCALES.



SCALE FOR MEASURING DIAMETERS OF STOPS FOR LENSES.



Each cross line varies in length from the adjacent one by $\frac{1}{100}$th of an inch.

To use: Lay the stop flat on this scale, and select the cross line which is of the same length as the greatest diameter of the opening; read this off, by means of the figures, which will be the measurements in $\frac{1}{100}$ths of an inch. The equivalent focal length of lens, divided by this measurement of the stop opening, will give the fraction expressing the ratio of aperture to focal length. The rapidity of different lenses, or of the same lens with different stops, is proportional to the squares of these ratios.

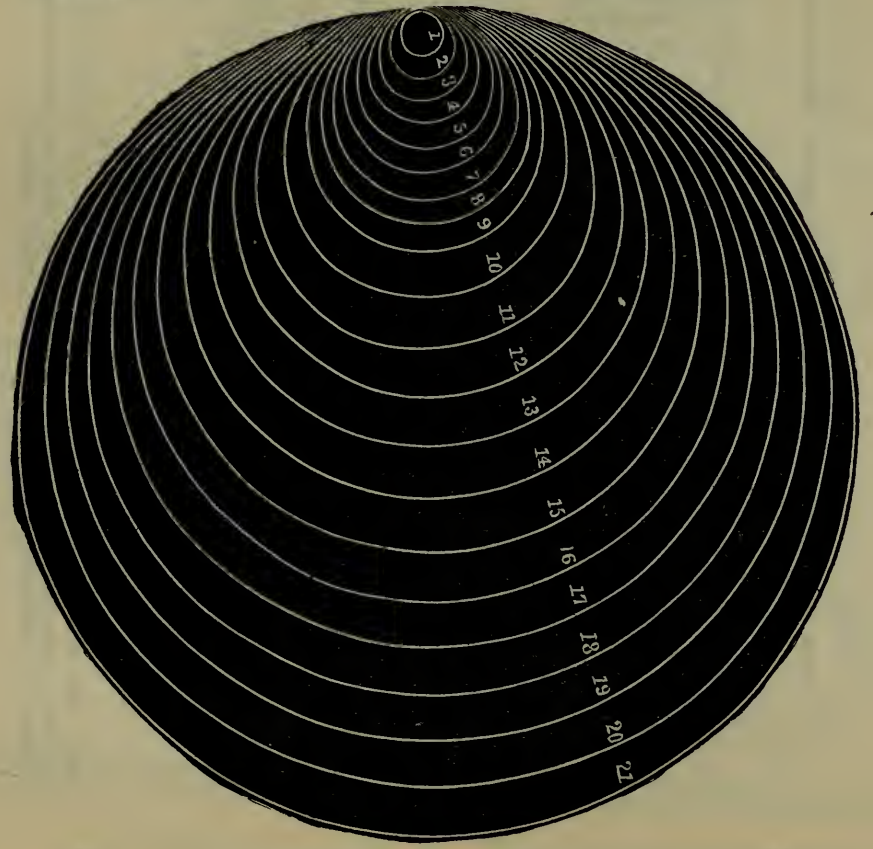
"UNIFORM SYSTEM" NUMBERS FOR STOPS FROM $\frac{f}{1}$ TO $\frac{f}{100}$.

In the following table Mr. S. A. Warburton has calculated the exposure necessary with every stop from $\frac{f}{1}$ to $\frac{f}{100}$ compared with the unit stop of the "uniform system" of the Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{4}$, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	*f*	U. S. No.	*f*	U. S. No.
1	$\frac{1}{16}$	15	14.06	58	210.25
$1\frac{1}{4}$	.097	16	16	59	217.56
1.414	$\frac{1}{8}$	17	18.06	60	225.00
$1\frac{1}{2}$	.140	18	20.25	61	232.56
$1\frac{3}{4}$	.191	19	22.56	62	240.25
2	$\frac{1}{4}$	20	25.00	63	248.06
$2\frac{1}{4}$	.316	21	27.56	64	256
$2\frac{1}{2}$	.390	22	30.25	65	264.06
2.828	$\frac{1}{8}$	22.62	32	66	272.25
$2\frac{3}{4}$	.472	23	33.06	67	280.56
3	.562	24	36.00	68	289.00
$3\frac{1}{4}$	.660	25	39.06	69	297.56
$3\frac{1}{2}$	.765	26	42.25	70	306.25
$3\frac{3}{4}$	.878	27	45.56	71	315.06
4	1.00	28	49.00	72	324.00
$4\frac{1}{4}$	1.12	29	52.56	73	333.06
$4\frac{1}{2}$	1.26	30	56.25	74	342.25
$4\frac{3}{4}$	1.41	31	60.06	75	351.56
5	1.56	32	64	76	361.00
$5\frac{1}{4}$	1.72	33	68.06	77	370.56
$5\frac{1}{2}$	1.89	34	72.25	78	380.25
5.656	2	35	76.56	79	390.06
$5\frac{3}{4}$	2.06	36	81.00	80	400.00
6	2.25	37	85.56	81	410.06
$6\frac{1}{4}$	2.44	38	90.25	82	420.25
$6\frac{1}{2}$	2.64	39	95.06	83	430.56
$6\frac{3}{4}$	2.84	40	100.00	84	440.00
7	3.06	41	105.06	85	451.56
$7\frac{1}{4}$	3.28	42	110.25	86	462.25
$7\frac{1}{2}$	3.51	43	115.56	87	473.06
$7\frac{3}{4}$	3.75	44	121.00	88	484.00
8	4	45	126.56	89	495.06
$8\frac{1}{4}$	4.25	45.25	128	90	506.25
$8\frac{1}{2}$	4.51	46	132.25	90.50	512
$8\frac{3}{4}$	4.78	47	138.06	91	517.56
9	5.06	48	144.00	92	529.00
$9\frac{1}{4}$	5.34	49	150.06	93	540.56
$9\frac{1}{2}$	5.64	50	156.25	94	552.25
$9\frac{3}{4}$	5.94	51	162.56	95	564.06
10	6.25	52	169.00	96	576.00
11	7.56	53	175.56	97	588.06
11.31	8	54	182.25	98	600.25
12	9.00	55	189.06	99	612.56
13	10.56	56	196.00	100	625.00
14	12.25	57	203.06		

THE PHOTOGRAPHIC SOCIETY'S (OF GREAT BRITAIN) STANDARD DIAPHRAGMS.

THE annexed diagram and table are intended to facilitate the calculation of the proper number with which to mark the diaphragms according to the Photographic Society of Great Britain's Uniform System, which will be found described on another page. This number it is proposed to call the "U. S." (or uniform system number). The numbered circles in the diagram represent the sizes of stops. The photographer, knowing the equivalent focus of his lens, looks along the line opposite the number which represents the circle nearest inside to his diaphragm, and when he gets to the column headed by that equivalent focus the number there found is the U. S. number to be marked on the diaphragm. For example: A lens of eight inches equivalent focus has a diaphragm in size about No. 5 on the diaphragm; running the eye along the line opposite No. 5 we find in the column under—"focus eight inches" the No. 11, which is the U. S. number required.



No. of Circle.	4 focus	5 focus	6 focus	7 focus	8 focus	9 focus	10 focus	12 focus	14 focus
1	25	39	56						
2	11	17	25	34	44	56	68		
3	6¼	10	14	19	25	31	40	56	
4	4	6¼	9	12	16	20	25	36	48
5	2⅞	4¼	6¼	8¼	11	14	17	25	34
6	2	3⅛	4½	6¼	8	10	13	18	25
7	1½	2⅓	3⅓	4⅞	6	8	10	14	19
8	1¼	2	2⅞	3⅞	5	6¼	8	11	15
9	1	1½	2¼	3	4	5	6¼	9	12¼
10		1	1½	2⅛	2⅞	3½	4⅛	6	8½
11			1¼	1½	2	2½	3⅕	5	6
12			⅞	1⅕	1½	2	2⅓	3½	4⅞
13				1	1¼	1⅚	1⅜	2⅞	4
14					1	1¼	1⅛	2¼	3
15						1	1⅛	1⅞	2½
16							1	1⅛	2
17								1⅛	7⅞
18								1⅛	1½
19								1	1⅛
20									1⅕
21									1

NOTE.—This table, taken from the "British Journal Photographic Almanac," has proved to be very convenient in the calculating of stop values.

EQUATIONS RELATING TO FOCI.

The following simple optical formulas and calculations, worked out by Mr. J. A. C. Branfill, for the *British Journal Almanac*, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes:

p = Principal focus.
F = Greater conjugate focus.
f = Lesser conjugate focus.
r = Ratio of any dimension in original to the same dimensions in copy (in case of reduction), or *vice versa* (in case of enlargement).
a = Diameter of aperture to lens.
x = Exposure required, assuming that $x = 1$ when $a = \frac{p}{4}$.

$$p = \frac{r(F+f)}{(r+1)^2}$$

$$f = p\left(\frac{1+r}{r}\right) = \frac{F+f}{r+1}$$

$$F = p(r+1) = rf$$

$$F+f = p \times \frac{(r+1)^2}{r} = p\left(2+r+\frac{1}{r}\right)$$

$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$

$$x = \frac{f^2}{16\,a^2}$$

N. B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

Note.—In case the above may not be clear to some photographers, the following rules may be better understood:

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance between it and the ground glass ($F+f$); next find the proportion which any dimension in the object bears to the same dimension on the ground glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply $F+f$ by r, and divide the product by the square of a number greater by one than r, that is by $(r+1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known), multiply p by the sum of $r+1$ and divide the product by r. Or divide $F+f$ by $r+1$.

To find the greater conjugate focus (F) multiply p by $r+1$. Or multiply f by r.

To find $F+f$ (the distance which the ground glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r+\frac{1}{r}+2$.

To find r divide $F-p$ (the difference between F and p) by p. Or divide p by $f-p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

For example Focus an object which is five inches high, so that it is one inch high on the ground glass; thus we know that $r = 5$. Next measure the distance between the object and the ground glass ($F+f$), which is found to be 45 inches.

Then $p = 45 \times$ (multiplied by) $5 \div$ (divided by) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 6\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$F+f = 6\frac{1}{4} \times (5+\frac{1}{5}+2) = 6\frac{1}{4} \times 7\frac{1}{5} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{4} - 6\frac{1}{4}) = 5$.

And x (the exposure required) will be $7\frac{1}{2} \times 7\frac{1}{2} \div (16 \times \frac{9}{16}) = 6\frac{1}{4}$; that is, the exposure will be $6\frac{1}{4}$ times as much as the exposure required with an aperture whose diameter equals $p \div 4$, assuming the aperture (a) to be $\frac{1}{4}$ inch diameter.

FOCUSING SCALES FOR ANY LENS OF FROM 3 TO 12 INCHES EQUIVALENT FOCUS.

Drawn by W. T. WINTRINGHAM.

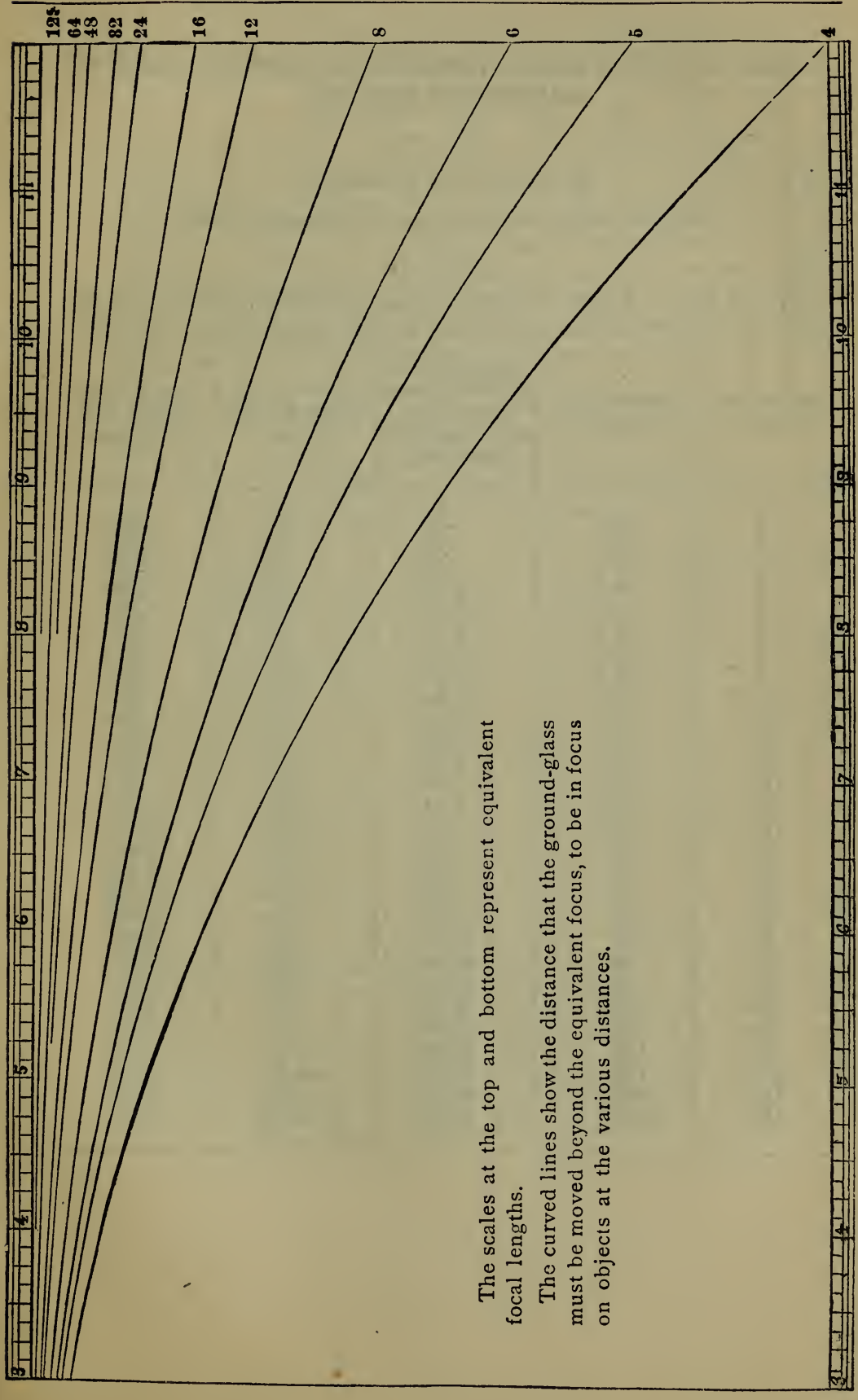


TABLE SHOWING DISPLACEMENT ON GROUND GLASS OF OBJECTS IN MOTION.

By HENRY L. TOLMAN.

[Republished, with corrections, from the *Photographic Times*.]

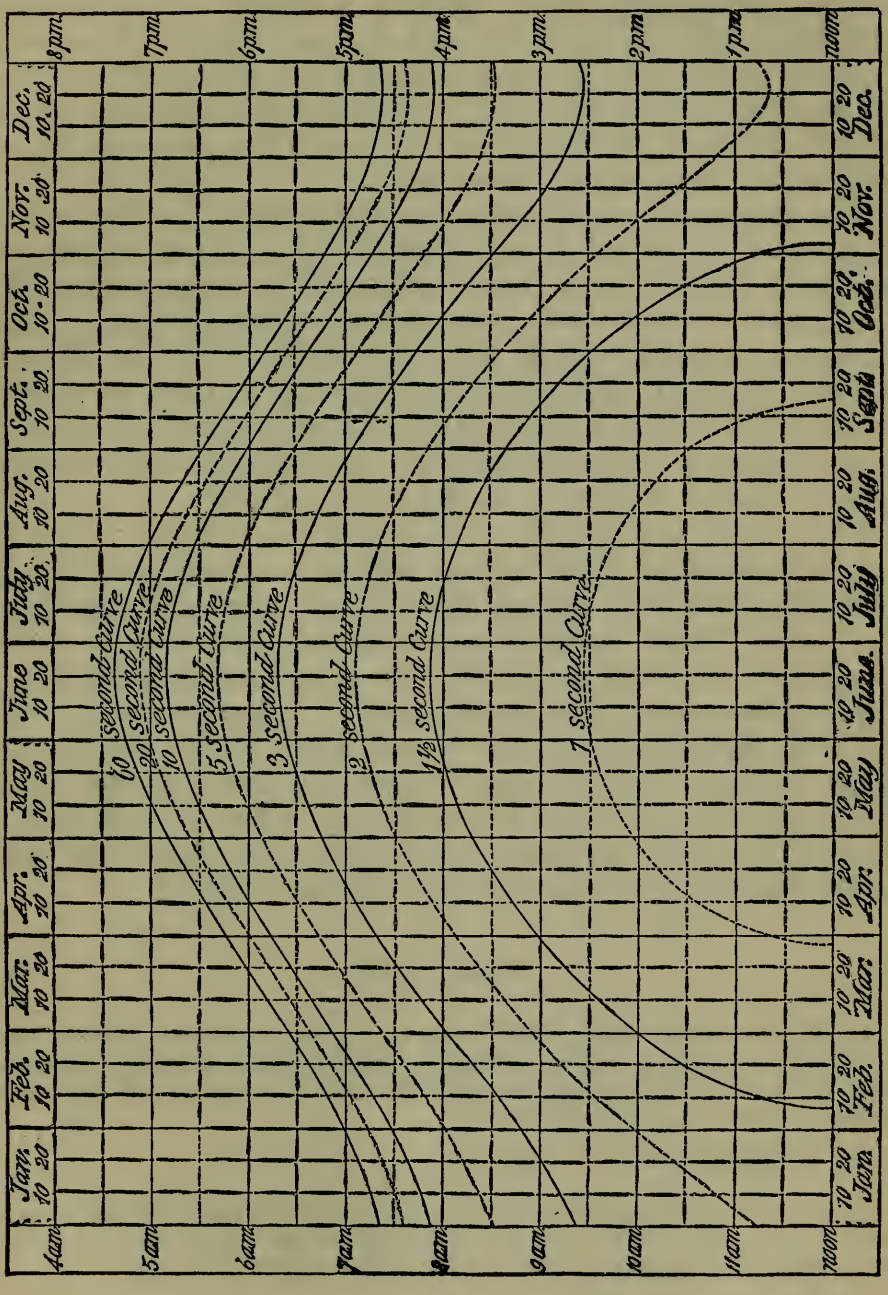
Lens 6 in Equiv. Focus, Ground Glass at Principal Focus of Lens.

Miles per Hour.	Feet per Second.	Distance on Ground Glass, in inches, with Object 30 Feet away.	Same with Object 60 Feet away.	Same with Object 120 Feet away.
1	1½	.29	.15	.073
2	3	.59	.29	.147
3	4½	.88	.44	.220
4	6	1.17	.59	.293
5	7½	1.47	.73	.367
6	9	1.76	.88	.440
7	10½	2.05	1·03	.513
8	12	2 35	1.17	.587
9	13	2.64	1.32	.660
10	14½	2.93	1.47	.733
11	16	3.23	1.61	.807
12	17½	3.52	1.76	.880
13	19	3.81	1.91	.953
14	20½	4.11	2.05	1.027
15	22	4.40	2.20	1.100
20	29	5.87	2.93	1.467
25	37	7.33	3.67	1.833
30	44	8.80	4.40	2.200
35	51	10.27	5.13	2.567
40	59	11.73	5.97	2·933
45	66	13.20	6.60	3.300
50	73	14.67	7.33	3.667
55	80	16.13	8.06	4.033
60	88	17.60	8.80	4.400
75	110	22.00	11.00	5.500
100	147	29.33	14.67	7.333
125	183	36.67	18.33	9.167
150	220	44.00	22.00	11.000

DIAGRAM OF COMPARATIVE EXPOSURES.

Computed for the latitude of Washington, D. C. (38 deg., 54 min., N.)

By Lieut. Commander S. W. Very, U. S. N.



The straight lines in this diagram represent divisions of time; the vertical ones showing the month and day, and the horizontal ones the time of day as shown by a sun-dial.

The curved lines are curves of equal altitudes of the sun, computed for the latitude of Washington, for the year 1889.

The combination of the two systems of lines is designed to enable the photographer, whether amateur or professional, who has at some time determined the length of exposure required under certain circumstances of subject, clouds, lens, diaphragm, plate or film, etc., to decide what exposure to give *under the same circumstances*, at any time between sunrise and sunset, on any day of the year.

The diagram is based upon one constructed for the latitude of London, published in the *Photographic News*, in 1887, and reprinted in the ANNUAL of 1888, and the same standard of comparison is used in this adaptation—that is, such circumstances of subject, clouds, lens, diaphragm, plate or film, etc., as will require an exposure of one second, at noon of any day between the 4th of April and the 7th of September, or at any time between a quarter to ten in the forenoon and a quarter past two in the afternoon on the 21st of June.

The diagram, although constructed for the year 1889, and for the latitude of Washington, will serve equally well for any other year, and well enough for ordinary purposes, throughout the United States (exclusive of Alaska), although in the extreme Northern and Southern belts it will not be accurate.

The diagram is strictly accurate for "apparent time" only, but it is sufficiently so for "local mean time" (which may differ sixteen minutes from "apparent time"), and in the great majority of places for "standard time" (which in some places differs half an hour from "mean time," and may differ three-quarters of an hour from "apparent time").

EXAMPLES.

Q. With a certain lens, diaphragm, etc., it is found that on the 20th of July, at 9.30 A.M., a certain subject requires three seconds' exposure; what time should be given on the 10th of December, at 3.30 P.M., the subject, lens, etc., being the same?

A. Fifteen seconds.

Q. At noon of the 15th of May, a certain subject required ten seconds; what length of exposure should be given to the same subject, with the same lens, diaphragm, etc., on the 1st of November, at 8 A.M.?

A. Forty-five seconds.

TABLE OF COMPARATIVE LIGHT VALUES.

By Rev. Dwight W. Smith.

While there is a wider range in timing the exposure of a dry plate than is generally supposed, yet it is well known that there is but one correct interval for the best results with a normal developer. To best approximate that interval at all available hours of the day and year requires some attention and experience. There was a time when plates of a given brand and sensitiveness were quite unreliable, but now that they are so uniform, and improving more and more in this direction, tables of light values that were found to be comparatively useless will now be found of increasing value. The subjoined table, based upon the diagram in this book, by Lieutenant S. W. Very, U. S. N., has been computed for the first half of each month, and at a glance one may obtain information that would otherwise require time and trouble, and that even skill and experience does not always provide for, especially during the time indicated in which there is a rapid loss of light. It will be seen that in January, the light value for noon is given as 1.7, while at 4 P.M. the exposure would necessarily be more than five times that duration. For July, the most rapid as well as longest available light of any month, the light at noon is indicated by .2 instead of 1.7, and at 3 P.M. more than twice the time will be required.

The first column indicates the hour of the day; the second column the comparative light values in whole numbers and tenths.

JANUARY.		FEBRUARY.		MARCH.		APRIL.	
8	10	8	6	8	3	8	2
9	4	9	4	9	2	9	1.5
10	2.5	10	2	10	1.5	10	1.7
11	2	11	1.7	11	1.2	11	1
12	1.7	12	1.5	12	1	12	1
1	1.7	1	2	1	1	1	1
2	2.5	2	2.7	2	1.7	2	1.2
3	4.5	3	3.5	3	2	3	1.5
4	9	4	5	4	4	4	2
		5	60	5	20	5	4
						6	20

MAY.		JUNE.		JULY.		AUGUST.	
8	1.7	8	1.7	8	1.5	8	1.7
9	1.2	9	1.2	9	1.2	9	1.5
10	1	10	1	10	1	10	1
11	.7	11	.6	11	.5	11	.7
12	.5	12	.3	12	.2	12	.5
1	.7	1	.5	1	.5	1	.5
2	1	2	.7	2	1	2	1
3	1.2	3	1.2	3	1.2	3	1.2
4	1.5	4	1.5	4	1.5	4	1.7
5	2.7	5	2.2	5	2.2	5	2.5
6	15	6	5	6	4	6	5
7	80	7	20	7	15	7	60

SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
8	2	8	3	8	4	8	9
9	1.5	9	1.7	9	3	9	3
10	1	10	1.5	10	2	10	2
11	1	11	1.2	11	1 7	11	1.5
12	.5	12	1	12	1.5	12	1.7
1	1	1	1.2	1	1.5	1	2
2	1.2	2	1.5	2	2	2	2.5
3	1.5	3	2	3	2.5	3	3.5
4	2	4	2.7	4	5	4	8
5	3	5	6	5	20	5	80
6	10	6	40	6	70		

PROF. BURTON'S TABLE OF COMPARATIVE EXPOSURES.

Apertures Calculated on the Standard System of the Photographic Society.	Sea and Sky.	Open Landscape.	Landscape with heavy foliage in foreground.	Under Trees, up to		Fairly Lighted Interiors.		Badly Lighted Interiors, up to		Portraits in bright diffused Light out of doors.	Portraits in good Studio Light.		Portraits in Ordinary Room.	
				mins.	secs.	mins.	secs.	hrs.	mins.		mins.	secs.	mins.	secs.
No. 1, or $\frac{f}{4}$	$\frac{1}{100}$ sec.	$\frac{1}{50}$ sec.	$\frac{1}{8}$ sec.	0	10	0	10	0	2	$\frac{1}{6}$ sec.	0	1	0	4
No. 2, or $\frac{f}{5.657}$	$\frac{1}{80}$ sec.	$\frac{1}{25}$ sec.	$\frac{1}{4}$ sec.	0	20	0	20	0	4	$\frac{1}{3}$ sec.	0	2	0	8
No. 4, or $\frac{f}{8}$	$\frac{1}{40}$ sec.	$\frac{1}{12}$ sec.	$\frac{1}{2}$ sec.	0	40	0	40	0	8	$\frac{2}{3}$ sec.	0	4	0	16
No. 8, or $\frac{f}{11.314}$	$\frac{1}{20}$ sec.	$\frac{1}{6}$ sec.	1 sec.	1	20	1	20	0	16	$1\frac{1}{3}$ sec.	0	8	0	32
No. 16, or $\frac{f}{16}$	$\frac{1}{10}$ sec.	$\frac{1}{3}$ sec.	2 secs.	2	40	2	40	0	32	$2\frac{2}{3}$ secs.	0	16	1	4
No. 32, or $\frac{f}{22.627}$	$\frac{1}{5}$ sec.	$\frac{2}{3}$ sec.	4 secs.	5	20	5	20	1	4	$5\frac{1}{3}$ secs.	0	32	2	8
No. 64, or $\frac{f}{32}$	$\frac{2}{5}$ sec.	$1\frac{1}{3}$ sec.	8 secs.	10	40	10	40	2	8	$10\frac{2}{3}$ secs.	1	4	4	16
No. 128, or $\frac{f}{45.255}$	$\frac{4}{5}$ sec.	$2\frac{2}{3}$ secs.	16 secs.	21	20	21	20	4	16	21 secs.	2	8	8	32
No. 256, or $\frac{f}{64}$	$1\frac{3}{5}$ sec.	$5\frac{1}{3}$ secs.	32 secs.	42	40	42	40	8	32	42 secs.	4	16	17	4

LANTERNISTS' READY REFERENCE TABLE.

(From Optical Magic Lantern Journal.)

If A=focal length of objective, B=diameter of slide, C=diameter of disc on screen, D=distance between objective and screen, then $D=\frac{C \times A}{B}$ $A=\frac{D \times B}{C}$ $C=\frac{D \times B}{A}$

The following table has been computed by these rules and will show by a glance the relations between the size of disc and distance from screen for object glasses of all foci from 4 inches to 15 inches. The diameter of slide is taken as 3 inches, that being the usual opening of the mat.

Distance between Lantern and Screen.	FOCUS OF LENS. 4in.	5in.	6in.	7in.	8in.	9in.	10in.	11in.	12in.	13in.	14in.	15in.
	DIAMETER OF DISC.											
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
10 feet.	7 6	6 0	5 0	4 3	3 9	3 4	3 0	2 9	2 6	2 4	2 2	2 0
11 "	8 3	6 7	5 6	4 9	4 2	3 8	3 4	3 0	2 9	2 6	2 4	2 2
12 "	9 0	7 2	6 0	5 2	4 6	4 0	3 7	3 3	3 0	2 9	2 7	2 5
13 "	9 9	7 10	6 6	5 7	4 11	4 4	3 11	3 7	3 3	3 0	2 9	2 7
14 "	10 6	8 5	7 0	6 0	5 3	4 8	4 2	3 10	3 7	3 3	3 0	2 9
15 "	11 3	9 0	7 6	6 5	5 8	5 0	4 6	4 1	3 9	3 6	3 3	3 0
20 "	15 0	12 0	10 0	8 7	7 6	6 8	6 0	5 6	5 0	4 7	4 3	4 0
25 "	18 9	15 0	12 6	10 9	9 4	8 4	7 6	6 10	6 3	5 0	5 4	5 0
30 "	22 6	18 0	15 0	12 10	11 3	10 0	9 0	8 2	7 6	6 11	6 5	6 0
35 "	26 3	21 0	17 6	15 0	13 1	11 8	10 6	9 6	8 9	8 1	7 6	7 0
40 "	30 0	24 0	20 0	17 2	15 0	13 4	12 0	10 10	10 0	9 2	8 6	8 0
45 "	33 9	27 0	22 6	19 3	16 10	15 0	13 6	12 3	11 3	10 4	9 8	9 0
50 "	37 6	30 0	25 0	21 5	18 9	16 8	15 0	13 8	12 6	11 6	10 9	10 0

EXAMPLES.—An 8in. focus lens at a distance of 35ft. will give a disc of 13ft. 1in. To produce a disc of 12ft. with a lens of 10in. focus, the lantern and screen must be separated by 40ft. To produce a disc of 15ft. at a distance of 45ft. will require a lens of 9in. focus.

TABLE FOR ENLARGEMENT AND REDUCTION

COMPUTED FOR CENTIMETERS OR INCHES.

Equivalent Focus of the Lens.	DISTANCES OF THE OBJECT AND THE GROUND GLASS SCREEN FROM THE CENTER OF THE OBJECTIVE.																								
	1 *t.*	2 *t.*	3 *t.*	4 *t.*	5 *t.*	6 *t.*	7 *t.*	8 *t.*	9 *t.*	10 *t.*	11 *t.*	12 *t.*	13 *t.*	14 *t.*	15 *t.*	16 *t.*	17 *t.*	18 *t.*	19 *t.*	20 *t.*	21 *t.*	22 *t.*	23 *t.*	24 *t.*	25 *t.*
5..	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130
	10	7.5	6.7	6.2	6	5.8	5.7	5.6	5.6	5.5	5.5	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.2	5.2	5.2	5.2
6..	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156
	12	9	8	7.5	7.2	7	6.9	6.8	6.7	6.6	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2
7..	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182
	14	10.5	9.3	8.8	8.4	8.2	8	7.9	7.8	7.7	7.6	7.6	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7.3	7.3	7.3
8..	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192	200	208
	16	12	10.7	10	9.6	9.3	9.1	9	8.8	8.8	8.7	8.7	8.6	8.6	8.5	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3
9..	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216	225	234
	18	13.5	12	11.3	10.8	10.5	10.3	10.1	10	9.9	9.8	9.8	9.7	9.6	9.6	9.6	9.5	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4
10..	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260
	20	15	13.3	12.5	12	11.7	11.4	11.3	11.1	11	10.9	10.8	10.8	10.7	10.7	10.6	10.6	10.6	10.5	10.5	10.5	10.5	10.4	10.4	10.4
11..	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	187	198	209	220	231	242	253	264	275	286
	22	16.5	14.7	13.8	13.2	12.8	12.6	12.4	12.2	12.1	12	11.9	11.8	11.8	11.7	11.7	11.6	11.6	11.6	11.6	11.5	11.5	11.5	11.5	11.4
12..	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288	300	312
	24	18	16	15	14.4	14	13.7	13.5	13.3	13.2	13.1	13	12.9	12.9	12.8	12.7	12.7	12.7	12.6	12.6	12.6	12.5	12.5	12.5	12.5
13..	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338
	26	19.5	17.3	16.3	15.6	15.2	14.9	14.6	14·4	14.3	14.2	14.1	14	13.9	13.9	13.8	13.8	13.7	13.7	13.7	13.6	13.6	13.6	13.5	13.5
14..	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	294	308	322	336	350	364
	28	21	18.7	17.5	16.8	16.3	16	15.8	15.6	15.4	15.3	15.2	15.1	15	14.9	14.9	14.8	14.8	14.7	14.7	14.7	14.6	14.6	14.6	14.6
15..	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	375	390
	30	22.5	20	18.8	18	17.5	17.1	16.9	16.7	16.5	16.4	16.3	16.2	16.1	16	15.9	15.9	15.8	15.8	15.8	15.7	15.7	15.7	15.6	15.6

16..	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336	352	368	384	400	416
	32	24	21.3	20	19.2	18.7	18.3	18	17.8	17.6	17.5	17.3	17.2	17.1	17.1	17	16.9	16.9	16.8	16.8	16.8	16.7	16.7	16.7	16.6
17..	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306	323	340	357	374	391	408	425	442
	34	25.5	22.7	21.3	20.4	19.8	19.4	19.1	18.9	18.7	18.5	18.4	18.3	18.2	18.1	18.1	18	17.9	17.9	17.9	17.8	17.8	17.7	17.7	17.7
18..	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288	306	324	342	360	378	396	414	432	450	468
	36	27	24	22.5	21.6	21	20.6	20.3	20	19.8	19.6	19.5	19.4	19.3	19.2	19.1	19.1	19	18.9	18.9	18.9	18.8	18.8	18.8	18.7
19..	38	57	76	95	114	133	152	171	190	209	228	247	266	285	304	323	342	361	380	399	418	437	456	475	494
	38	28.5	25.3	23.8	22.8	22.2	21.7	21.4	21.1	20.9	20.7	20.6	20.5	20.4	20.3	20.2	20.1	20.1	20	20	19.9	19.9	19.8	19.8	19.8
20..	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520
	40	30	26.7	25	24	23.3	22.9	22.5	22.2	22	21.8	21.7	21.5	21.4	21.3	21.3	21.2	21.1	21.1	21	21	20.9	20.9	20.8	20.8
21..	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	441	462	483	504	525	546
	42	31.5	28	26.3	25.2	24.5	24	23.6	23.3	23.1	22.9	22.8	22.6	22.5	22.4	22.3	22.2	22.2	22.1	22.1	22	22	21.9	21.9	21.8
22..	44	66	88	110	132	154	176	198	220	242	264	286	308	330	352	374	396	418	440	462	484	506	528	550	572
	44	33	29.3	27.5	26.4	25.7	25.1	24.8	24.4	24.2	24	23.8	23.7	23.6	23.5	23.4	23.3	23.2	23.2	23.1	23	23	23	22.9	22.9
23..	46	69	92	115	138	161	184	207	230	253	276	299	322	345	368	391	414	437	460	483	506	529	552	575	598
	46	34.5	30.7	28.8	27.6	26.8	26.3	25.9	25.6	25.3	25.1	24.9	24.8	24.6	24.5	24.4	24 4	24.3	24.2	24.2	24.1	24	24	24	23.9
24..	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	600	624
	48	36	32	30	28.8	28	27.4	27	26.7	26.4	26.2	26	25.8	25.7	25.6	25.5	25.4	25.3	25.3	25.2	25.1	25.1	25	25	25
25..	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650
	50	37.5	33.3	31.3	30	29.2	28.6	28.1	27.8	27.5	27.3	27.1	26.9	26.8	26.7	26.6	26.5	26.4	26.3	26.3	26.2	26.1	26.1	26	26

The use of the above table will best be explained by illustrations:

To enlarge six times with a lens of 15 centimeters (or inches) focal length. We find in the table under 6 *t.* and opposite 15, the figures $\frac{105}{17.5}$, hence the object must be 17.5, and the screen 105 centimeters (or inches) from the centre of the lens.

To reduce eight times with a lens of 19 centimeters (or inches) focus, the object must be 171 and the screen 21.4 centimeters (or inches) from centre of lens.

The table can be formulated thus: Where p = focal length of lens, a = distance from ground-glass to centre of lens and b = distance from object to centre of lens, then $\frac{1}{a} + \frac{1}{b} = \frac{1}{p}$

AMERICAN, FRENCH, ENGLISH AND GERMAN MONEY.

American.	French.	English.	German.	American.	French.	English.	German.
dols. c.	*fr. c.*	*s. d.*	*m. pf.*	*dols. c.*	*fr. c.*	*s. d.*	*m. pf.*
0 01	0 05	0 0½	0 04		2 87.5		2 30
0 02	0 10	0 1	0 08	0 56	2 92	2 4	
	0 12.5		0 10		**3 00**		**2 40**
0 03	0 15	0 1½	0 12	0 58	3 02	2 5	
	0 20		0 16	**0 60**	**3 12.5**	**2 6**	**2 50**
0 04	0 21	0 2		0 62	3 23	2 7	
	0 25		0 20		3 25		2 60
0 05	**0 26**	**0 2½**		0 64	3 33	2 8	
0 06	0 31	0 3	0 25		3 37.5		2 70
	0 37.5		0 30	0 66	3 44	2 9	
0 08	0 42	0 4			3 50		2 80
	0 50		0 40	0 68	3 54	2 10	
0 10	0 52	0 5			3 62.5		2 90
0 12	**0 62.5**	0 6	**0 50**	0 70	3 65	2 11	2 92
0 14	0 73	0 7		**0 72**	**3 75**	**3 0**	**3 00**
	0 75		0 60	0 74	3 85	3 1	3 08
0 16	0 83	0 8			3 87.5		3 10
	0 87.5		0 70	0 76	3 96	3 2	
0 18	0 94	0 9			**4 00**		**3 20**
	1 00		**0 80**	0 78	4 06	3 3	
0 20	1 04	0 10			4 12.5		3 30
	1 12.5		0 90	**0 80**	4 17	3 4	
0 22	1 15	0 11			4 25		3 40
0 24	**1 25**	**1 0**	**1 00**	0 82	4 27	3 5	
0 25	1 30	1 0½	1 04	**0 84**	**4 37.5**	**3 6**	**3 50**
0 26	1 35	1 1	1 08	0 86	4 48	3 7	
	1 37.5		1 10		4 50		3 60
0 28	**1 46**	1 2		0 88	4 58	3 8	
	1 50		1 20		4 62.5		3 70
0 30	1 56	1 3		0 90	4 69	3 9	
	1 62.5		1 30		4 75		3 80
0 32	1 67	1 4		0 92	4 79	3 0	
	1 75		1 40		4 87.5		3 90
0 34	1 77	1 5		0 94	4 90	3 11	
0 36	**1 87.5**	**1 6**	**1 50**	**0 96**	**5 00**	**4 0**	**4 00**
0 38	1 98	1 7		1 00	5 21	4 2	4 16
	2 00		1 60	1 20	6 25	5 0	5 00
0 40	2 08	1 8		1 44	7 50	6 0	6 00
	2 12.5		1 70	1 68	8 75	7 0	7 00
0 42	2 19	1 9		1 92	10 00	8 0	8 00
	2 25		1 80	2 16	11 25	9 0	9 00
0 44	2 29	1 10		2 40	12 50	10 0	10 00
	2 37.5		1 90	2 64	13 75	11 0	11 00
0 46	2 40	1 11	1 92	2 88	15 00	12 0	12 00
0 48	**2 50**	**2 0**	**2 00**	3 84	20 00	16 0	16 00
0 50	2 60	2 1	2 08	4 80	25 00	20=£1	20 00
	2 62.5		2 10	9 60	50 00	£2	40 00
0 52	2 71	2 2		14 40	75 00	£3	60 00
	2 5		2 20	19 20	100 00	£4	80 00
0 54	2 81	2 3		24 00	125 00	£5	100 00

STANDARD OF FOREIGN COINS FOR CUSTOMS PURPOSES

As Proclaimed by the Director of the United States Mint, January 1, 1890, and Corrected to Date.

The Value of Imports for the Assessment of Duties is ascertained by converting Currency of Invoice into Money of the United States, as per following Table:

Country.	Unit of Currency.	Sign.	Value in U. S. Cur.
Argentine Republic	Peso=100 Centavos	$	.96.5
Austria-Hungary	Florin=100 Kreutzer	Fl.	.34.5
Azores	Milreis =100 Reis	Rs. $	.83.5
Belgium	Franc=100 Centimes	Frs.	.19.3
Bolivia	Boliviano =10 Reales	$	.69.8
Brazil	Milreis=1000 Reis	Rs. $	.54.6
British North America, *Ex. Newfoundland*	Dollars=100 Cents	$	1.00
Chili	Peso=100 Centavos	$	.91.2
China (*Haikwan*)	Tael=10 Mace	Tael.	1.14.8
Columbia, U. S. of	Peso=100 Centavos	$	.69.8
Costa Rica	Peso=100 Centavos	$	.69.8
Cuba	Peso=100 Centavos	$	.92.6
Denmark	Krone=100 Ore	Kr.	.26.8
Ecuador	Sucre=100 Centavos	$	.69.8
Egypt	Pound=100 Piastres	£	4.94.3
France	Franc=100 Centimes	Frs.	.19.3
Germany	Mark=10 Pfennige	Mks.	.23.8
Great Britain	Pound Sterling.=20 Shillings	£	4.86.65
Greece	Drachma=100 Lepta	Dr.	.19.3
Guatemala	Peso =100 Centavos	$	.69.8
Hayti	Gourde=100 Cents	$	.69.5
Honduras	Peso=100 Centavos	$	.69.8
India	Rupee=16 Annas	Rs.	.33.2
Italy	Lira=100 Centesimi	L.	.19.3
Japan	Yen =100 Sen Gold	Yen.	.99.7
do	do. = do. Silver	Yen.	.75.2
Liberia	Dollar=100 Cents	$	1.00
Mexico	Peso =100 Centavos	$	.75.8
Netherlands	Florin=100 Cents	$	.40.2
Newfoundland	Dollar=100 Cents	$	1.01.4
Nicaragua	Peso =100 Centavos	$	.69.8
Norway	Krone=100 Ore	Kr.	.26.8
Paraguay	Peso=100 Centavos	$	1.00
Peru	Sol =100 Centavos	$	.69.8
Porto Rico	Peso =100 Centavos	$	.92.5
Portugal	Milreis=1000 Reis	Rs. $	1.08
Russia	Rouble=100 Copecks	S. Ro.	.55.8
Salvador	Peso=100 Centavos	$	.69.8
Sandwich Islands	Dollar=100 Cents	$	1.00
Spain	Peseta=100 Centimos	Ptas.	.19.3
Sweden	Krone =100 Ore	Kr.	.26.8
Switzerland	Franc =100 Centimes	Frs.	.19.3
Tripoli	Mahbub=20 Piastres.	$	.62.9
Tunis	Piastre =16 Caroubs	Ptrs.	.11.8
Turkey	Piastre =30 Paras,	Ptrs.	.04.4
Uruguay	Patacon=100 Centavos	$	.94.9
Venezuela	Bolivar=100 Centimos	Brs.	.14

USUAL SIZES OF FRENCH, GERMAN AND ITALIAN DRY PLATES.

French and German.	*Inches.*
6½x 9 Centimetres	2.5x 3.6
9 x12 "	3.6x 4.7
12 x15 "	4.7x 5.9
13 x18 "	5.1x 7.0
12 x20 "	4.7x 7.8
15 x21 "	5.9x 8.2
15 x22 "	5.9x 8.6
18 x24 "	7.2x 9.4
21 x27 "	8.2x10.6
24 x30 "	9.4x11.8
27 x33 "	10.6x12.9
27 x35 "	10.6x13.7
30 x40 "	11.8x15.7
40 x50 "	15.7x19.6
50 x60 "	19.6x23.6

Italian.	*Inches.*
9x12 Centimetres	3.6x 4.7
12x16 "	4.7x 6.3
12x18 "	4.7x 7.2
13x18 "	5.1x 7.0
12x20 "	4.7x 7.8
18x24 "	7.0x 9.4
21x27 "	8.2x10 6
24x30 "	9.4x11.8
27x33 "	10.6x12.9
30x36 "	11.8x14.1
40x50 "	15.7x19.6
50x60 "	19.6x23.6

SIZES OF GLASS, MOUNTS, PAPER, ETC.

Petite cards	1⅝x3⅛
One-ninth plate	2 x2½
One-sixth plate	2¾x3¼
One-fourth plate	3¼x4¼
Half plate	4¼x5½ and 4¼x6½
Half plate (English)	4¾x6½
Whole plate (4–4)	6½x8½
Extra 4–4	8 x10

Other sizes are expressed by inches.

Sizes of Mounts.

Stereoscopic	3½x7, 4x7, 4¼x7, 4½x7, 5x8		
Victoria	3¼x5	Minette	1½x2⅜
Imperial	7⅞x9⅞	Card	2½x4⅛
Boudoir	5¼x8½	Cabinet	4¼x6½
Panel	4 x8¼	Promenade	4⅛x7⅛

Sizes of Albumen Paper.

18x22¾, 20½x24½, 22x36, 26x40, 27x42.

Size of blotting paper 19x24

FREEZING MIXTURES.

Reducing the Temperature — Parts.	From — Degrees of the Celsius	To — Thermometer.
3 Nitrate of sodium + 4 Water	+13.2 deg.	— 5.3 deg.
9 Phosphate of sodium + 4 dilute Nitric acid	+10 "	— 9 "
3 Sulphate of sodium + 2 dilute Nitric acid	+10 "	—10 "
1 Nitrate of sodium + 4 Water		—10.6 "
1 Chloride of potassium + 4 Water		—11.8 "
5 Sal ammoniac + 5 Saltpetre + 16 Water	+10 deg.	—12 "
1 Nitrate of ammonia + 1 Water	+10 "	—15.5 "
8 Sulphate of sodium + 5 conc. Sulphuric acid	+10 "	—17 "
1 Sulphocyanate of Potass. + 1 Water	+18 "	—21 "
1 Chloride of sodium + 3 Snow		—21 "
1 Sal ammoniac + 1 Saltpetre + 1 Water	+ 8 deg.	—24 "
3 Crystal. chloride of calcium + 1 Snow		—36 "
1 Snow + 1 dilute Sulphuric acid	— 5 deg.	—41

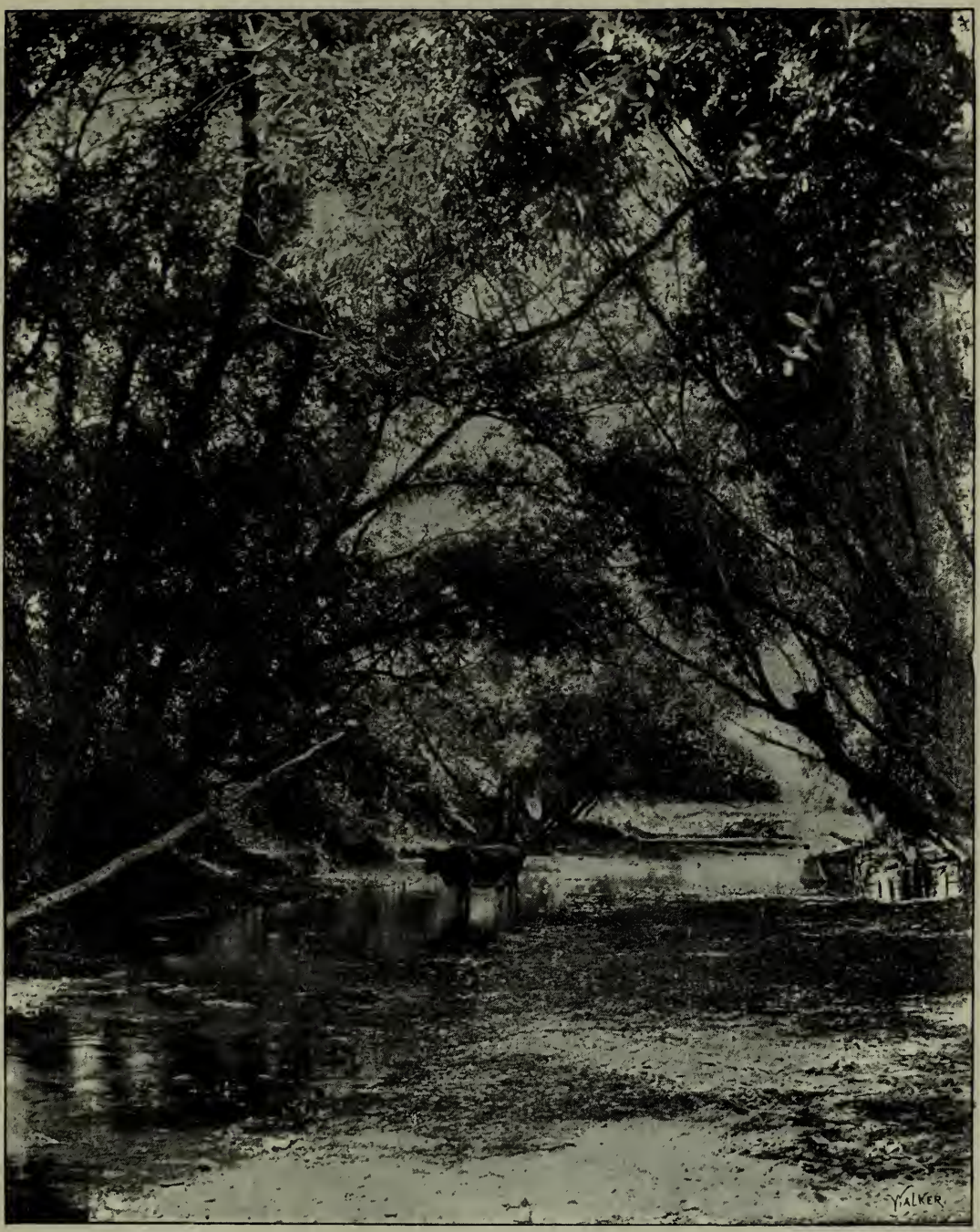
LIST OF THE PRINCIPAL CHEMICALS USED IN PHOTOGRAPHY, WITH ENGLISH, LATIN, GERMAN AND FRENCH TERMS.

COMPILED BY C. L. LOCHMAN.

ENGLISH.	I ATIN.	GERMAN.	FRENCH.
Acid Acetic	Acidum aceticum	Essigsäure	Acide acetique.
" " Glacial	Acidum aceticum glaciale.	Eisessig	Vinaigre glacial.
" Chromic	Acidum chromicum	Chromsäure	Acide chromique.
" Citric	Acidum citricum	Citronensäure	Acide citrique.
" Gallic	Acidum gallicum	Gallussäure	Acide gallique.
" Hydrochloric " *Muriatic.*	Acidum hydrochloricum.	Salzsäure	Acide chlorhydrique.
" Nitric	Acidum nitricum	Salpetersäure	Acide nitrique (azotique).
" Oxalic	Acidum oxalicum	Oxalsäure	Acide oxalique.
" Pyrogallic; Pyrogallol.	Acidum pyrogallicum.	Pyrogallussäure; Pyrogallol.	Acide pyrogallique.
" Tartaric	Acidum tartaricum	Weinsteinsäure	Acide tartarique.
" Sulphuric	Acidum sulphuricum.	Schwefelsäure	Acide sulfurique.
" Tannic; Tannin.	Acidum tannicum.	Gerbsäure	Acide tannique.
Alcohol, Ethyl	Alcohol	Weingeist	Alcool.
Alcohol, Wood	Alcohol methylicum.	Holzgeist	Alcool methylique.
Alum, Ammonia	Aluminii et ammonii sulphas.	Ammoniak-Alaun	Sulphate d'alumine et d'ammoniaque.
Alum, Chrome	Chromii et potassii sulphas.	Chrom-Alaun	Alun chromi-potassique.
Alum, Potassa	Aluminii et potassii sulphas.	Kali-Alaun	Sulfate d'alumine et de potasse.
Ammonium Bichromate.	Ammonii bichromicum	Dobletchromsaures Ammon.	Bichromate d'ammoniaque.
Ammonium Nitrate	Ammonii nitras	Ammoniumnitrat	Azotate d'ammionaque
Benzin	Benzinum	Petroleumbenzin	Benzine.
Benzol	Benzolum	Benzol	Benzole.
Bromine	Bromum; Brominium	Brom	Brome.
Cadmium Bromide	Cadmii bromidum	Kadmiumbromid; Bromkadmium.	Bromure de cadmium.
Cadmium Iodide	Cadmii iodidum	Kadmiumjodid; Jodkadmium.	Iodure de cadmium.
Calcium Bromide	Calcii bromidum	Bromcalcium	Bromure de calcium.
" Carbonate	Calcii carbonas	Calciumcarbonat	Carbonate de calcium.
" Iodide	Calcii iodidum	Jodcalcium	Iodure de calcium.
Chloroform	Chloroformum	Chloroform	Choloforme.
Collodion	Collodium	Collodion	Collodion.
Dextrin	Dextrinum	Stärkegummi	Dextrine.
Eikonogen	Eikonogen	Eikonogen	Eikonogen.
Ether (Sulphuric)	Aether (sulphuricus)	Aether; Schwefeläther	Ether sulfurique.
Gelatin	Gelatina	Gelatin	Gelatine.
Glycerin	Glycerinum	Glycerin	Glycerine.
Gold	Aurum	Gold	Or.
" Chloride	Auri Chloridum	Goldchlorid	Chlorure d'or.
" and Sodium Chloride.	Auri et sodii chloridum	Natriumgoldchlorid	Chlorure d'or et de Sodium
Gum Arabic	Gummi Arabicum	Arabisches Gummi	Gomme Arabique.
Gum Sandarac	Sandaraca	Sandarak	Sandaraque.
Gum Shellac	Ressina lacca	Lack; Gummilack	Laque.
Hydrochinon; Hydroquinon.	Hydrochinonum	Hydrochinon	Hydrochinon.
Iodine	Iodum; Iodinium	Jod	Iode.
Iron Sulphate	Ferri sulphas	Ferrosulfat	Sulfate de fer.
Lithium Bromide	Lithii bromidum	Bromlithium	Bromure de lithium.
" Iodide	Lithii iodidum	Jodlithium	Iodure de lithium.
Magnesium Bromide	Magnesii bromidum	Brommagnesium	Bromure de magnesium
" Iodide	Magnesii iodidum	Jodmagnesium	Iodure de magnesium.
" Sulphate	Magnesii sulphas	Magnesiumsulfat	Sulfate de magnesie.
Mercury Bichloride	Hydrargyri bichloridum.	Aetzendes Quecksilber-chlorid.	Deutochlorure de mercure.

LIST OF THE PRINCIPAL CHEMICALS, Etc.—*Continued.*

ENGLISH.	LATIN.	GERMAN.	FRENCH.
Oil of Lavender	Oleum Lavandulæ	Lavendelöl	Essence de Lavand.
Oil of Turpentine	Oleum Terebinthinæ	Terpintinöl	Essence Terebinthine.
Platinum Chloride	Platini chloridum	Platinchlorid	Perchlorure de platine
Platino-Potassium Chloride.	Platini et Potassii chloridum.	Kali-Platinumchlorid	Chlorure de platinum et de potassium.
Potassa, Sulphurated; Lilver of Sulphur.	Potassa sulphurata	Schwefelleber	Sulfure de potasse.
Potassium Bichromate	Potassii bichromas	Kaliumbichromat	Bichromate de potasse
" Bromide	Potassii Bromidum	Kaliumbromid	Bromure de potassium
" Carbonate	Potassii carbonas	Kaliumcarbonat	Carbonate de potasse.
" Cyanide	Potassii cyanidum	Cyankalium	Cyanure de potassium.
" Ferricyanide	Potassii ferricyanidum	Ferridcyankalium	Ferricyanure de potassium.
" Ferrocyanide	Potassii ferrocyanidum	Ferrocyankalium	Ferrocyanure de potassium.
" Hydrate; Potassa.	Potassii hydras; Potassa.	Aetzkali	Potasse caustique.
" Iodide	Potassii iodidum	Jodkalium	Iodure de potassium.
" Oxalate, neutral.	Potassii oxalas	Kalium Oxalat, neutrales.	Oxalate de potasse neutre.
" Sulphite	Potassii sulphis	Kaliumsulfit	Sulfite de potassium.
" Sulphocyanide	Potassii sulphocyanidum.	Kalium sulfocyanat; Rhodankalium.	Sulfocyanure de potassium.
Pyroxylin; Gun Cotton.	Pyroxylinum	Collodionwolle; Schiess-baumwolle.	Pyroxyle; Fulmi-coton
Silver	Argentum	Silber	Argent.
" Nitrate	Argenti nitras	Silbernitrat	Nitrate d'argent.
" Oxide,	Argenti oxidum	Silber Oxyd	Oxyde d'argent.
Sodium Acetate	Sodii acetas	Natriumacetat	Acetate de soude.
" Biborate; Borax.	Sodii biboras	Natrium borat; Borax.	Borate de soude.
" Bicarbonate	Sodii bicarbonas	Natriumbicarbonat	Bicarbonate de soude.
" Bromide	Sodii bromidum	Bromnatrium	Bromure de sodium.
" Carbonate	Sodii carbonas	Natriumcarbonat	Carbonate de soude.
" Chloride	Sodii chloridum	Chlornatrium	Chlorure de sodium.
" Citrate	Sodii citras	Natriumcitrat; Citronensaures Natron.	Citrate de soude.
" Hydrate; Soda	Sodii hydras; Soda	Aeznatron	Soude caustiqne.
" Hyposulphite or Thiosulphate.	Sodii hyposulphis	Unterschwefligsaures Natron.	Hyposulphite de soude
" Iodide	Sodii iodidum	Jodnatrium	Iodure de sodium.
" Sulphite	Sodii sulphis	Natrium sulfit	Sulfite de soude.
" Tungstate	Sodii tungstas	Wolfraumsaures Natron.	Tungstate de soude.
Starch	Amylum	Stärke; Stärkmehl	Amidon.
Strontium Bromide	Strontii bromidum	Bromstrontium	Bromure de strontium.
" Chloride	Strontii chloridum	Chlorstrontium	Chlorure de strontium.
" Iodide	Strontii iodidum	Jodstrontium	Iodure de strontium.
Tannin, see Tannic Acid.			
Turpentine, Crude or White.	Terebinthina communis	Geweiner Terpentin	Terebenthine commune.
Uranium Bromide	Uranii bromidum	Bromuranium	Bromure d'uranium.
Uranium Nitrate	Uranii nitras	Salpetersaures Uranoxyd.	Nitrate d'urane.
Water, Distilled	Aqua destillata	Destillirtes Wasser	Eau distillée.
Water of Ammonia	Aqua ammoniæ	Salmiakgeist; Ammoniak-Flüssigkeit.	Eau d'ammoniaque.
Zinc Bromide	Znci bromidum	Zinkbromid; Bromzink.	Bromure de zinc.
Zinc Chloride	Zinci chloridum	Chlorzink	Chlorure de zinc.
Zinc Iodide	Zinci iodidum	Zinkjodid; Jodzink	Iodure de zinc.



W. C. Wulker, Photo.

The N. Y. Engraving & Printing Co., Engravers.

THE NOONDAY HOUR.

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RUSSIAN.

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UNITED STATES PATENTS.

SUITS for redress on account of infringement of patents are brought in the United States Circuit Court for the District where the defendant resides. Redress may be had through an injunction preventing further infringement and an accounting of the damages caused the patentee, or the profits, gains or advantages made by the infringer.

Until recently appeals from decisions rendered by the United States Circuit Court were necessarily taken to the Supreme Court of the United States, and, owing to the great amount of business done by the latter, a delay of at least four years was suffered by an appellee.

Very recently a new Court, designated the Circuit Court of Appeals, has been provided. Appeals may hereafter be taken to this Court, and are likely to be reached and disposed of quite expeditiously. This is of particular advantage to patentees, in view of the fact that their monopolies run but a limited time.

Patents are issued in the name of the United States and under the seal of the Patent Office to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts, and expense, has invented and produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas-relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics, any new and original impression, ornament, pattern, print, or picture to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture; or any new, useful, and original shape or configuration of any article of manufacture, the same not having been known nor used by others before his invention or production thereof, nor patented nor described in any printed publication, upon payment of the fees required by law and other due proceedings had.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors; but in such case they may become joint patentees.

Every patent contains a grant to the patentee, his heirs or assigns, for the term of seventeen years, of the exclusive right to make, use, and vend the invention or discovery throughout the United States and the Territories, referring to the specification for the particulars thereof.

If it appear that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Letters Patent granted a foreign government will not, while in force, prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use into the United States more than two years prior to the application. But every patent granted for an invention which is the subject of Letters Patent still in

force and previously granted to the same inventor in a foreign country will be so limited as to expire at the same time with such foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Applications.

Application for a patent must be made in writing to the Commissioner of Patents. The applicant must also file in the Patent Office a written description of the same, and of the manner and process of making, constructing, compounding, and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound and use the same; and in case of a machine, he must explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions, and particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery. The specification and claim must be signed by the inventor and attested by two witnesses.

The applicant shall make oath that he verily believes himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement for which he solicits a patent; that he does not know and does not believe the same was ever before known or used, and shall state of what country he is a citizen. Such oath may be made before any person within the United States authorized by law to administer oaths, or, when the applicant resides in a foreign country, before any minister, charge d'affaires, consul, or commercial agent holding commission under the Government of the United States, or before any notary public of the foreign country in which the applicant may be.

When the nature of the case admits of drawings, the applicant must furnish one copy signed by the inventor or his attorney in fact, and attested by two witnesses, to be filed in the Patent Office. In all cases which admit of representation by model, the applicant, if required by the Commissioner, shall furnish a model of convenient size to exhibit advantageously the several parts of his invention or discovery.

On the filing of such application and the payment of the fee required by law, if, on such examination, it appears that the claimant is justly entitled to a patent under the law, and that the same is sufficiently useful and important, the Commissioner will issue a patent therefor.

Assignments.

Every patent or any interest therein shall be assignable in law by an instrument in writing; and the patentee, or his assigns or legal representatives may, in like manner, grant and convey an exclusive right under his patent to the whole or any specified part of the United States.

Reissues.

A reissue is granted to the original patentee, his legal representatives, or the assignees of the entire interest when, by reason of a defective or insufficient specification, or by reason of the patentee claiming as his invention or discovery more than he had a right to claim as new, the original patent is inoperative or invalid, provided the error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention. The applications must be made and the specification sworn to by the inventors, if they be living.

Caveats.

A caveat under the patent law is a notice given to the Office of the caveator's claim as inventor, in order to prevent the grant of a patent to another for the same alleged invention upon an application filed during the life of the caveat without notice to the caveator.

Any citizen of the United States who has made a new invention or discovery, and desires further time to mature the same, may, on payment of a fee of $10, file in the Patent Office a caveat setting forth the object and the distinguishing characteristics of the invention, and praying protection of his right until he shall have matured his invention. Such caveat shall be filed in the confidential archives of the Office and preserved in secrecy, and shall be operative for the term of one year from the filing thereof.

An alien has the same privilege, if he has resided in the United States one year next preceding the filing of his caveat, and has made oath of his intention to become a citizen.

The caveat must comprise a specification, oath, and, when the nature of the case admits of it, a drawing, and, like the application, must be limited to a single invention or improvement.

Fees.

Fees must be paid in advance, and are as follows: On filing each original application for a patent, $15. On issuing each original patent, $20. In design cases: For three years and six months, $10; for seven years, $15; for fourteen years, $30. On filing each caveat, $10. On every application for the reissue of a patent, $30. On filing each disclaimer, $10. For certified copies of patents and other papers, including certified printed copies, ten cents per hundred words. For recording every assignment, agreement, power of attorney, or other paper, of three hundred words or under, $1; of over three hundred and under one thousand words, $2; of over one thousand words, $3. For copies of drawings, the reasonable cost of making them.

COPYRIGHT LAW OF THE UNITED STATES.

The author, inventor, designer, or proprietor of any book, map, chart, dramatic or musical composition, engraving, cut, print, or photograph, or negative thereof or of a painting, drawing, chromo, statue, statuary, and of models or designs intended to be perfected as works of the fine arts, and the executors, administrators, or assigns of any such person, may secure to himself the sole liberty of printing, publishing, completing, copying, and vending the same, and, if a dramatic composition, of publicly performing or representing it, or causing it to be performed or represented by others.

Foreigners as well as citizens of the United States are, by a law which came into effect on July 1st, 1891, entitled to copyrights in this country, providing the nations of which they are citizens permit to United States citizens the benefit of copyright on the same basis as their own citizens, or such nation is a party to an international agreement providing for reciprocity in copyright to which the United States may become a party. Up to the present time, Great Britain, France, Belgium and Switzerland are the only foreign nations whose citizens are entitled to copyrights in this country.

Every applicant for a copyright must state distinctly the name and residence of the claimant, and whether right is claimed as author, designer, or proprietor. No affidavit or formal application is required.

A *printed* copy of the title (besides the two copies to be deposited after publication) of the book, map, chart, dramatic or musical composition, engraving, cut, print, or photograph, or a *description* of the painting, drawing, chromo, statue, statuary, or model or design for a work of the fine arts, for which copyright is desired, must be sent by mail or otherwise, *prepaid*, addressed "LIBRARIAN OF CONGRESS, WASHINGTON, D. C." This must be done before publication of the book or other article.

The *printed title* required may be a copy of the title-page of such publications as have title-pages. In other cases, the title must be printed expressly for copyright entry, with name of claimant of copyright. The style of type is immaterial, and the print of a type-writer will be accepted. But a separate title is required for each entry, and *each* title must be printed on paper as large as commercial note. The title of a *periodical* must include the date and number.

FEES.

The legal fee for *recording* each copyright claim is 50 cents, and for a *copy* of this record (or certificate of copyright) an addtional fee of 50 cents is required. Certificates covering more than one entry are not issued.

Not later than the day of publication of each book or other article, in this country or abroad, two complete copies of the best edition issued must be sent, to perfect the copyright, with the address "LIBRARIAN OF CONGRESS, WASHINGTON, D. C." The postage must be prepaid, or else the publications enclosed in parcels covered by printed Penalty labels, furnished by the Librarian, in which case they will come FREE by mail without limit of weight, according to rulings of the Post Office Department. Without the deposit of copies above required the copyright is void, and a penalty of $25 is incurred. No copy is required to be deposited elsewhere.

NOTICE OF COPYRIGHT.

A copy of the record (or duplicate certificate) of any copyright entry will be furnished, under seal, at the rate of 50 cents each.

No copyright is valid unless notice is given by inserting in every copy published, on the title-page or the page following, if it be a book; or, if a map, chart, musical composition, print, cut, engraving, photograph, painting, drawing, chromo, statue, statuary, or model or design intended to be perfected as a work of the fine arts, by inscribing upon some portion thereof, or on the substance on which the same is mounted, the following words, viz.: "*Entered according to Act of Congress, in the year* ——, *by*——, *in the office of the Librarian of Congress, at Washington*," or, at the option of the person entering the copyright, the words: "*Copyright*, 18—, *by*——."

The law imposes a penalty of $100 upon any person who has not obtained copyright who shall insert the notice, "*Entered according to Act of Congress*," or "*Copyright*," etc., or words of the same import, in or upon any book or other article.

TRANSLATIONS AND DRAMATIZATIONS.

Any author may reserve the right to translate or dramatize his own work. In this case notice should be given by printing the words "*Right of translation reserved*," or "*All rights reserved*," below the notice of copyright entry, and notifying the Librarian of Congress of such reservation, to be entered upon the record.

Since the phrase *all rights reserved* refers exclusively to the author's right to dramatize or to translate, it has no bearings upon any publications except original works, and will not be entered upon the record in other cases.

Duration of Copyright.

The original term of copyright runs for twenty-eight years. *Within six months before* the end of that time, the author or designer, or his widow or children, may secure a renewal for the further term of fourteen years, making forty-two years in all. Applications for renewal must be accompanied by explicit statement of ownership, in the case of the author, or of relationship, in the case of his heirs, and must state definitely the date and place of entry of the original copyright. Advertisement of renewal is to be made within two months of date of renewal certificate, in some newspaper, for four weeks.

Assignments.

A copyright is assignable in law by any instrument of writing, but such assignment must be recorded in the office of the Librarian of Congress within sixty days from its date. The fee for this record and certificate is $1, and for a certified copy of any record of assignment, $1.

Serials or Separate Publications.

In the case of books published in more than one volume, or of periodicals published in numbers, or of engravings, photographs, or other articles published with variations, a copyright is to be entered for each volume or part of a book, or number of a periodical, or variety, as to style, title, or inscription of any other article. But a book published serially in a periodical under the same general title, requires only one entry. To *complete* the copyright on such a work, two copies of each serial part, as well as of the complete work (if published separately), must be deposited.

Works of Art.

To secure a copyright for a painting, statue, or model or design intended to be perfected as a work of the fine arts, a definite description must accompany the application for copyright, and a photograph of the same as large as cabinet size mailed to the Librarian of Congress not later than the day of publication of the work or design.

Copyrights cannot be secured through the Librarian of Congress upon trade-marks, nor upon mere names of companies or articles, nor upon prints or labels intended to be used with any article of manufacture. If protection for such names or labels is desired, application must be made to the Patent Office, where they are registered at a fee of $6 for labels and $25 for trade-marks. The trade-marks and labels are, however, protected without registration throughout most of the States.

RECORD OF PHOTOGRAPHIC PATENTS.

ISSUED BY THE UNITED STATES PATENT OFFICE FROM SEPTEMBER 15, 1891, TO SEPTEMBER 6, 1892, INCLUSIVE, WITH NAMES OF PATENTEES.

COMPILED BY F. C. BEACH.

459,411.—Automatic Registering Photographic Apparatus.
E. E. MOORE, Syracuse, N. Y.

459,938.—Photographic Vignetting Attachment.
G. H. RICHARDS, Philadelphia, Pa.

460,099.—Camera.
F. A. HETHERINGTON, Indianapolis, Ind.

460,264.—Envelope for Photographs, etc.
H. C. LAVETTE, Chicago, Ill.

460,337.—Flash-Torch for Photographs.
M. R. HAMPERLEY, Philadelphia, Pa.

460,417.—Solar Camera.
F. T. WILSON, Stillwater, Minn.

460,570.—Manufacture of Photographic Films.
B. J. EDWARDS, London, Eng.

460,621.—Process of Giving a Matt-Surface to Albumenized Silver Paper Photographs.
J. D. WRIGGLESWORTH and F. C. BINUS, Wellington, New Zealand.

460,672.—Register for Camera Roll-Holders.
H. C. BOYER, Philadelphia, Pa.

461,306.—Roll-Holder for Cameras.
T. H. BLAIR, Boston, Mass.

461,307.—Camera Shutter.
T. H. BLAIR, Boston, and J. H. CROWELL, Vineyard Haven, Mass.

461,308.—Roll-Holder for Camera,
T. H. BLAIR and F. H. KELLY, Boston, Mass.

461,905.—Photographic Camera.
J. H. HARE and B. P. JOHNSON, Brooklyn, N. Y.

461,910.—Photographic Shutter.
E. B. BARKER, Newark, N. J.

462,116.—Means for Holding and Carrying Photographic Films.
E. E. ELLIS and A. L. LEHUKERING, Rochester, N. Y.

462,335.—Photographic Shutter.
F. M. SPAULDING, Kalamazoo, Mich.

462,382.—Photographic Printing Machine.
D. C. HOOVER, Buffalo, N. Y.

462,459.—Magazine Photographic Camera.
W. TRUEMAN, Brooklyn, N. Y.

462,507.—Flash-Light for Photography.
E. M. PINE, Washington, D. C.

462,590.—Album.
G. SCHWAB, New York, N. Y.

462,591.—Album Leaf.
G. SCHWAB, New York, N. Y.

462,842.—Magazine Photographic Camera.
G. H. HURLBUT, Belvidere, Illinois.

463,030.—Album.
B. BRANNER, New York, N. Y.

463,123.—Photographic Camera.
F. A. HETHERINGTON, Indianapolis, Ind.

463,284.—Photographic Camera.
F. BURROWS, Philadelphia, Pa.

463,557.—Photograph Exhibitor.
C. G. SODERSTROM, Denver, Colo.

463,630.—Enlarging Camera.
C. R. JENNE, Fort Wayne, Ind.

463,705.—Carrier or Envelope for Photographic Films or Plates.
E. W. PERRY, JR., New York, N. Y.

463,870.—Calcium Light Apparatus.
G. W. PROWSE, Montreal, Canada.

464,059.—Photometer and Actinometer.
L. H. BARKER, Williamsport, Pa.

464,260.—Photographic Camera Shutter.
A. G. TISDELL, Brooklyn, N. Y.

464,359.—Device for Copying Pictures.
L. A. HAGAN, Little Rock, Ark.

464,384.—Tripod.
S, J. OSBORNE, Allegheny, Pa.

464,462.—Lens Supporter for Photographic Camera.
C. MILLS, New York, N. Y.

464,471.—Tripod.
J. L. BROWN, Atlanta, Ga.

464,783.—Magazine Camera.
T. S. WILES, Albany, N. Y.

464,998.—Shutter for Photographic Apparatus.
W. E. SCHNEIDER, Washington, D. C.

464,999.—Tripod.
W. E. SCHNEIDER, Washington, D. C.

465,178.—Photographic Process for Printing in Colors.
J. C. HÔSCH, Vienna, Austria-Hungary.

465,277.—Photographic Printing-Frame.
H. KUHN, Springfield, Mo.

465,409.—Projecting or Optical Lantern.
O. KNIFE, Philadelphia, Pa.

465,740.—Coin-Operated Photograph Machine.
P. V. W. WELSH, New York, N. Y.

465,802.—Multiplying Camera.
J. C. RANDALL and W. E. PRICE, Cincinnati, Ohio.

466,000.—Photographic Printing-Frame.
A. BARKER, Peekskill, N. Y.

466,150.—Light Casing for Stereopticons.
C. BESELER, Jersey City, N. J.

466,338.—Photographic Camera.
W. H. FULLER, Passaic, N. J.

466,534.—Art of Preparing and Transferring Photographic and other Designs for Engraving.
W. J. CHARLTON Providence, R. I.

467,423.—Photograph Gallery Wagon.
T. J. MERRITT, St. Louis, Mo.

467,454.—Photographic Camera.
J. T. WALKER, Palmyra, N. Y.

467,600.—Burnisher.
L. A. BUCHANAN, St. Louis, Mo.

467,696.—Flash-Light Burner.
S. M. WILLIAMS, San Francisco, Cal.

468,456.—Plate-Holder.
W. H. LEWIS, Huntington, N. Y.

467,244.—Blue-Printing Apparatus.
P. HEINZE, Chicago, Ill.

470,012.—Method of Producing Photo-Mechanical Printing Plates.
L. SHAEFER, Heilbronn, Germany.

470,054.—Photographic Roller-Holder.
G. JONES, Rochester, N. Y.

470,783.—Camera.
A. B. DOBBS, New Haven, Conn.

470,907.—Dissolving Mechanism for Magic Lanterns.
P. A. BRADFORD, Oswego, Kansas.

471,088.—Photographic Shutter.
F. A. ANTHONY, Hackensack, N. J., and W. H. LEWIS, Huntington, N. Y.

471,186.—Art of Producing Colored Photographs.
W. MCDONOUGH, Chicago, Ill.

471,187.—Art of Producing Colored Photographs.
J. W. MCDONOUGH, Chicago, Ill.

471,305.—Magic Picture.
F. TSCHOFEN, Austria.

471,387.—Photographic Album.
J. R. JONES, Philadelphia, Pa.

471,392.—Tripod.
C. MILLS, New York, N. Y.

471,422.—Pyroxyline Varnish.
JULIA HALL, Crawford, N. J.

471,469.—Madrine for Forming Flexible Photographic Films.
G. EASTMAN, Rochester, N. Y.

471,512.—Photographic Camera.
J. H. HARE, Brooklyn, N. Y.

471,584.—Photographic Cameia.
G. WHITNEY, Winnetka, Ill.

471,585.—Photographic Camera.
G. WHITNEY, Winnetka, Ill.

471,586.—Package of Photographic Films.
G. WHITNEY, Winnetka, Ill.

471,675.—Photographic Shutter.
G. W. Low and W. SHAKESPEARE, Jr., Kalamazoo, Mich.

471,715.—Magazine for Cameras.
M. B. FEENEY, New York City.

472,196.—Stereoscopic Album.
J. H. MCGREW, Chicago, Ill.

472,257.—Photographic Camera.
B. J. EDWARDS, London, Eng.

472,442.—Magazine Camera.
A. L'EPLATTENIER, Brooklyn, N. Y.

472,470.—Album.
J. BAUM and J. MÜLLER, Berlin, Germany.

472,702.—Photographic Plate-Changing Apparatus.
F. A. FICHTNER, Dresden, Germany.

472,812.—Art of Making Portraits or other Pictures.
F. PIERA Y DE MATA, Havana, Cuba.

472,883.—Photographic Shutter.
F. R. HOYT, Watkins, N. Y.

472,912.—Magic Lantern Advertising Apparatus.
W. G. SPIEGEL, New York, N. Y.

473,188.—Photographic Shutter.
G. F. GREEN, Kalamazoo, Mich.

473,356.—Photographic Shutter.
F. SEROUS, Berlin, Germany.

473,357.—Support for Camera or other purposes.
F. SEROUS, Berlin, Germany.

473,358.—Photographic Camera.
F. SEROUS, Berlin, Germany.

473,359.—Plate-holder.
F. SEROUS, Berlin, Germany.

473,375.—Coin-operated Photographic Apparatus.
W. A. C. BERNITT, Hamburg, Germany.

473,679.—Coloring and Burnishing Composition.
J. F. THOMPSON, Rochland, Mass.

473,753.—Making Relief Plates by Photography.
J. HUSNIK, Prague, Austria, Hungary.

473,767.—Process of Improving Oil Paintings by Photography.
L. MEYER, Berlin, Germany.

473,814.—Candle-lamp for Use in Photographic Dark-rooms.
H. A. BENHAM and W. H. TOMSON, London, Eng.

474,571.—Photographic Plate-holder.
J. H. BALLMAN, St. Louis, Mo.

474,708.—Solar Camera.
J. F. WIEST, Huntington, Ind.

474,833.—Photographic Kit.
J. H. IDEN, Bourbon, Ind.

474,850.—Process of Producing Photographs on Hard Surfaces.
ARMAND-MÜLLER JACOBS, New York, N. Y.

475,084.—Camera.
F. E. IVES, Philadelphia, Pa.

475,372.—Process of Developing Photographic Pictures.
M. ANDRÉSEN, Germany.

475,654.—Photographic Shutter.
J. R. ALBRECHT and E. ORTMANN, New York, N. Y.

475,919.—Photographic Camera.
R. DE BARRIE, New York, N. Y.

476,041.—Photographic Printing Frame.
F. A. DALY, Lowell, Mass.

476,264.—Magnesium Light Composition.
E. HACKH, Stuttgart, Germany.

476,357.—Photograph Holder.
VIOLA J. AUGIR, Springfield, Mo.

476,481.—Apparatus for Trimming Photographic Prints.
H. H. NEWCOMB, Boston, Mass.

476,562.—Photographic Camera.
W. SCORER, Havant, Eng.

476,863.—Tripod Head.
L. E. BENNETT, McHenry, Ill.

477,012.—Camera Shutter.
L. M. KORDS, Munich, Germany.

477,243.—Photographic Roll-holder,
F. A. BROWNELL, Rochester, N. Y.

477,259.—Picture Exhibitor.
F. E. MERKEL, New York, N. Y.

477,337.—Photographic Film-holder.
T. SAULT, New Haven, Conn.

477,486.—Photographic Developer.
M. ANDRÉSEN, Berlin, Germany.

477,588.—Camera Shutter.
A. BARKER, Peekskill, N. Y.

477,696.—Photographic Plate-holder.
A. E. PAGE, Philadelphia, Pa.

477,728.—Photographic Paper-holder and Cutter.
T. E. WOOD, Kalamazoo, Mich.

478,235.—Photographic Plate-holder.
C. H. LOHMAN, Chicago, Ill.

478,390.—Album Case.
W. BERGNER, Baltimore, Md.

478,478.—Picture-holder.
A. D. STEWART, Ithaca, N. Y.

478,663.—Photographic Printing Machine.
J. URIE, Jr., Jersey City, N. J.

478,739.—Illuminating Lens.
L. E. DAVENPORT, New York, N. Y.

478,780.—Photographic Camera.
W. H. BRISTOL, Hoboken, N. J.

478,837.—Photographic Camera.
H. A. BENEDICT, New York, N. Y.

478,887.—Stand for Exhibiting Pictures.
V. L. M. RENARD, Paris, France.

478,909.—Camera Shutter.
T. H. BLAIR and F. H. KELLEY, Boston, Mass.

479,000.—Tripod.
O. H. HANENSTEIN, Buffalo, N. Y.

479,186.—Photographic Plate-holder.
J. H. HARE, Brooklyn, N. Y.

479,305.—Photographic Films, Manufacture of.
H. M. REICHENBACH, Rochester, N. Y.

479,587.—Magazine Camera.
S. C. FAY and H. WILLIS, Rochester, N. Y.

479,667.—Photographic Album.
G. SCHWAB, New York, N. Y.

480,808.—Camera Attachment.
E. DE MOULIN, Greenville, Ill.

480,995.—Camera Shutter.
W. H. BRISTOL, Hoboken, N. J.

481,343.—Camera Shutter.
W. H. BRISTOL, Hoboken, N. J.

481,802.—Plate Attachment for Cameras.
G. L. MINEAR, Ottumwa, Iowa.

482,002.—Photographic Background Holder.
A. C. CASWELL, Fitchburg, Mass.

482,238.—Attachment for Stereopticons, Magic Lanterns, etc.
H. W. FORCE, Newburgh, N. Y.

DESIGN PATENTS.

21,096.—Photographic Card.
C. A. WRIGHT.

TRADE MARKS.

20,185.—Photographic Plates or Films.
G. CRAMER.

20,186.—Photographic Plates or Films.
G. CRAMER.

20,254.—Photographic Plates and Films.
G. CRAMER.

20,518.—Chemical Preparations for Use in Photography.
ACTIEN GESELLSCHAFT FÜR ANILINE FABRIKATION.

20,647.—Photographic Dry-Plates.
HARVARD DRY-PLATE COMPANY.

20,706.—Photographic Dry-Plates.
HARVARD DRY-PLATE COMPANY.

20,707.—Photographic Dry-Plates.
HARVARD DRY-PLATE COMPANY.

21,409.—Photographic Paper.
A. SCHWARZ.

21,430.—Photographic Paper.
E. LIESEGANG.

21,547.—Prints and Reproductions by Photo-mechanical Processes.
C. B. WOODWARD.

21,572.—Photographic Paper-Plates and Chemicals.
A. SCHWARZ.

21,596.—Photographic Dry-Plates.
L. H. BAEKLAND.



RATES OF DOMESTIC POSTAGE

TO ANY PART OF THE UNITED STATES, CANADA, OR MEXICO.

SEE NOTE H.

	cts.	oz.	See Spec'l Note.
Address Tags	1	1	*a*
Bill Heads	1	1	*a*
Blotters (printed)	1	1	*a*
Blue Prints	1	2	*d*
Books, printed	1	2	*d*
Cards, playing	1	1	*a*
" printed	1	2	*a*
" business			
" Christmas, etc.‡			
" Easter‡			
" New Year‡			
Chromos‡	1	2	*a*
Catalogues	1	2	*d*
Circulars	1	2	*d*
Coins	1	1	*a b*
Copy (MSS.)	2	1	*e*
" (with proof sheets)	1	2	*e*
Crayon	1	1	
Desk Blotters	1	1	*a*
Drawings / Designs (Pen or Pencil)	1	1	* *e*
Easter Cards‡	1	2	*a*
Engravings	1	2	*a*
Handbills	1	2	*a*
Letters	2	1	*e*
Labels (printed)	1	2	*a*
Lithographs	1	2	*a*
Manifold Letters	2	1	*e*
Manuscript	2	1	*e*
Magazines	1	4	*d*
Merchandise	1	1	*a b*
Maps (printed)	1	2	*e*
Newspapers	1	4	*d*
New Year Cards‡	1	2	
Packages, sealed	2	1	*b*
Packages, unsealed	1	1	† *b*
Pamphlets	1	2	*d*
Patterns (cut)	1	1	*a*
Periodicals	1	4	*d*
PHOTOGRAPHS	1	2	*d*
Pictures (scrap)	1	2	
Playing Cards	1	1	*a*
Postal Cards	1	ea.	*f*
Printed Matter (*not merchandise or samples*)	1	2	*d*
Printed Envelopes	1	1	*a*
Prospectuses	1	2	*d*
Proof Sheets	1	2	*d g*
Plans (in writing)	2	1	*e*
Registration	10	ea.	*i*
Samples	1	1	*b*
Sample copies of regular publications mailed by publisher (second-class)	1	lb.	
Sample copies of regular publications not mailed by publisher	1	4	*a*
Scrap Pictures	1	2	*a*
Seeds, Plants, etc.	1	2	
Specie	1	1	*a b*
Stereoscopic Views	1	2	*d*
Tickets	1	2	*a*
Type Writer Work	2	1	*e*
Valentines (if printed without embellishment with silk, satin, etc.)	1	2	*a*
Visiting Cards (printed)	1	2	*a*

* If pen or pencil drawings contain no written letters, figures, or words, they are fourth class matter, otherwise first class.

† May be either third or fourth class.

‡ Third class matter if printed on paper; if on silk, cotton, satin, canvas, or other material than paper or paper board, fourth class matter.

GENERAL NOTES.

Cards, circulars, catalogues, etc., relating to the business of one or more firms, and different articles of all kinds and classes, may be placed in the same package, provided that the highest rate of postage that any part of the contents is subject to shall be prepaid on the whole package.

The following articles are unmailable, and will not be dispatched in any case:—Spirituous, malt, or vinous liquids, poisons, explosive matter, inflammable articles, live or dead animals, insects (except queen bees when safely secured), substances exhaling a bad odor, fresh fruits and vegetables, obscene or indecent books, prints, writings, or papers; all postal cards or letters on the envelopes of which lewd, obscene, or lascivious delineations, offensive duns, epithets, terms, or language are written or printed, all matter concerning lotteries or schemes devised and intended to defraud the public, or for the purpose of obtaining money under false pretences, and all mail matter not addressed to a post-office or to no particular person, firm, company, or publication.

Special Delivery.—Any mail matter, when bearing, in addition to the regular postage, a "special delivery" stamp (face value, ten cents), will be immediately delivered by special messenger on its arrival at destination, between the hours of 7 A.M. and 7 P.M., and within one mile from the post-office, if it be not a letter-carrier office. At letter-carrier offices special delivery is obligatory within the carrier limits, and between the hours of 7 A.M. and 11 P.M.

Note A.

Fourth Class Matter—Samples and Merchandise.—Weight limited to 4 pounds. Postage must be fully prepaid. The rate is ONE CENT AN OUNCE OR FRACTION THEREOF. Merchandise may have printing on it or on the wrapper. Written marks, in addition to the address, are allowed on Fourth Class matter, as follows:—The name and address of sender preceded by the word "From"; and any names, numbers, marks, or letters for the purpose of description. A request to the delivering Postmaster may also be written asking him to notify sender if the package is not delivered; also an ordinary request to return to the sender in case of non-delivery.

Note B.

Articles of the Fourth Class liable to injure or deface the mails, such as flour, sugar, glass, needles, nails, pens, etc., must first be placed in a bag, box or open envelope, which must then be enclosed in another outside tube or box, made of metal or hardwood without sharp corners or edges and having a sliding clasp or screw lid, thus securing the articles in a double package; if the articles are fragile, they must be packed with sawdust, cotton or other packing material in the inside pocket. Powdered articles, such as flour, sugar, etc., must be enclosed in a transparent bag. Admissible liquids and oils (not exceeding 4 ounces liquid measure), pastes, salves or articles easily liquefiable, must conform to the following conditions: When in glass bottles or vials, such bottles or vials must be strong enough to stand the shock of handling in the mails, and must be enclosed in a wooden or papier-mache block or tube not less than three-sixteenths of an inch thick in the thinnest part, strong enough to support the weight of mails piled in bags and resist rough handling; and there must be provided, between the bottle and its wooden case, a cushion of cork crumbs, cotton, felt, asbestos, or some other absorbent, sufficient to

protect the glass from shock in handling; the block or tube impervious to liquids, including oils, etc., to be closed by a tightly fitting screw-lid of wood or metal, with a rubber or other pad so adjusted as to make the block or tube water-tight and to prevent the leakage of the contents in case of breaking of the glass. When enclosed in a tin cylinder, metal case or tube, such cylinder, case or tube should have a screw-lid with a rubber or cork cushion inside in order to make the same water-tight, and should be securely fastened in a wooden or papier-mache block (open only at one end), and not less in thickness and strength than above prescribed. Manufacturers or dealers intending to transmit articles or samples in considerable quantities, should submit a sample package, showing their mode of packing, to the Postmaster at the mailing office, who will see that the conditions of this section are carefully observed.

Note D.

Third Class Matter.—PREPAYMENT.—Postage must be fully prepaid, otherwise the matter will be "held for postage." The rate is ONE CENT FOR EVERY TWO OUNCES OR FRACTION THEREOF. THE LIMIT OF WEIGHT IS 4 pounds, except on single books. WRITING.—No writing is permitted on Third Class matter, except as follows: The name and address of the sender on the outside or inside of package, preceded by the word "From," and any printing not in the nature of personal correspondence. The sender is further allowed to mark a word or passage in a book or paper to which he desires to call special attention. He may also write a simple inscription or dedication upon the cover or blank leaf of a book or pamphlet. The date, address and signature of a circular may be written. Any other writing on Third Class matter will subject the package to letter rates of postage, and may render the sender liable to a fine of Ten Dollars. PHOTOGRAPHS and BLUE PRINTS must bear no other writing than the name of the sender.

WRAPPING.—Mail matter of the Third Class must be so wrapped or enclosed that it can be readily examined without destroying the wrapper; otherwise it will be subject to postage at the First Class rate (two cents per ounce), as will all articles enclosed in sealed envelopes with clipped ends, sides or corners, or in boxes with covers secured by nails, and all packages the wrappers of which are secured to the enclosure by postage stamps.

Note E.

First Class.—This class includes letters, postal cards, sealed packages, all matter wholly or partly in writing (whether manuscript or produced by type-writer or copying press), drawings, designs, plans and maps, if they contain descriptive words, letters, or figures in writing, produced by hand, manuscript for publication not accompanied by proof sheets, and all personal correspondence, whether in writing or in print. (See under heads "Third Class," "Fourth Class," notes "A" and "D," certain writing permitted in or on articles of those Classes.)

The rate of postage on mail matter of the First Class (sealed or unsealed) is TWO CENTS FOR EACH OUNCE OR FRACTION THEREOF, excepting postal cards, and excepting also letters for *local delivery* posted at the post-office where no letter carriers are employed, in which case the rate is ONE CENT PER OUNCE OR FRACTION THEREOF.

The law provides that the postage on all mail matter of the First Class shall be prepaid only by postage stamps or by enclosure in government stamped envelopes, and that any article of this Class (not entitled by law to free transmission in the mails) deposited in a post-office wholly unpaid or prepaid *less than one full rate, can not be forwarded or delivered*, but must

be "held for postage." LIMIT OF WEIGHT.—There is no limit to the weight of letters or packages of First Class matter. WRAPPING OR ENCLOSURE.—Mail matter of the First Class may be wrapped or enclosed in any manner that the sender may desire. RETURN.—Letters not delivered will be returned to writer free, if a request to that effect is placed on the envelope. FORWARDING.—A letter will be forwarded by the Postmaster who may hold it, to another post-office, at the request of the person to whom the letter is addressed. Letters addressed to the care of another person, or erroneously delivered, may be redirected and returned within a reasonable time to post-office, and will be forwarded without additional charge.

The putting on of requests to return the matter to the sender in case of non-delivery is recommended by the Post-Office Department—not on first-class alone, but on all matter.

Note F.

Postal Cards.—No cards are "Postal Cards" except those issued by authority of the Postmaster-General (the imitation of which is forbidden and punished by law); and so-called "Postal Cards" issued by private parties are subject to letter rates of postage when they contain any written matter whatever in addition to the date, and the name of the addressee and of the sender, and the correction of mere typographical errors therein. Nothing whatever may be attached to a Postal Card except an address label, which may be pasted to the *address side*, and no printing or writing is permitted upon the address side of Postal Cards, except that imprinted thereon at the manufactory and such as may be necessary for the proper direction of the same. Postal Cards are returned to the senders when unclaimed, but requests to so return should *not* be placed on the address side. Postal Cards are unmailable as such when incomplete or mutilated, and in all cases where any of the above conditions are not complied with.

Note G.

Proof Sheets may be corrected or uncorrected, with or without the original manuscript, additions to or alterations in the matter, or directions as to the typographical part of the work; but directions in writing as to binding, quality of paper, etc., are not permissible unless the letter rate of postage be paid.

Note H.

Canada and Mexico.—Matter mailed in the United States, addressed to Mexico, is subject to the same postage rates and conditions as it would be if it were addressed for delivery in the United States, except that articles of miscellaneous merchandise (fourth-class matter) not sent as *bona-fide* trade samples, are required to be sent by "Parcels Post," and that the following articles are *absolutely excluded* from the mails without regard to the amount of postage prepaid, or the manner in which they are wrapped, viz.:

All sealed packages, other than letters in their usual and ordinary form; *all* packages (including packages of second-class matter, which weigh more than 4 pounds 6 ounces), except such as are sent by "Parcels Post;" liquids, pastes, confections, and fatty substances; publications which violate any copyright law in Mexico.

Single volumes of printed books, *in unsealed* packages, are transmissible to Mexico in the regular mails without limit as to weight.

"*Commercial Papers*," and *bona-fide* trade samples are transmissible to Mexico in the regular mails at the postage rate given above, opposite "Commercial Papers" and "Samples of Merchandise," respectively. See also Note 15, pp. 815 and 816 of the GUIDE for January, 1890.

Matter mailed in the United States, addressed to Canada, is subject to the same postage rates and conditions as it would be if it were addressed for delivery in the United States, except that "Commercial Papers" are transmissible at the postage rate given above opposite "Commercial Papers," and that the following articles are *absolutely excluded* from the mails, without regard to the amount of postage prepaid, or the manner in which they are wrapped, viz.:

All sealed packages, other than letters in their usual and ordinary form; *all* packages (except single volumes of printed books and packages of second-class matter), which weigh more than 4 pounds 6 ounces; Police Gazettes; publications which violate any copyright law of Canada.

Note I.

Registration.—All kinds of mail matter can be registered at the rate of ten cents for each package, in addition to the postage at regular rates, both postage and fee to be fully prepaid by stamps; all conditions as to marks, contents and method of securing packages being the same as described under the various classes (Notes A, D, E). Each package must bear name and address of sender, and a receipt will be returned from the person to whom addressed.

Domestic Money Orders.

For sums not exceeding $5	$0 05
" " " " 10	08
" " " " 15	10
" " " " 30	15
" " " " 40	20
" " " " 50	25
" " " " 60	30
" " " " 70	35
" " " " 80	40
" " " " 100	45

The fee for a Postal Note is 3 cents.

A Postal Note may be drawn for any amount from one cent to four dollars and ninety-nine cents.

INTERNATIONAL MONEY ORDERS.

The fees for International Money Orders are as follows:

For sums not exceeding $10				$0 10	Over $50 and not exceeding $60			$0 60
Over $10 and not exceeding $20				20	" 60 " " 70			70
" 20 " " 30				30	" 70 " " 80			80
" 30 " " 40				40	" 80 " " 90			90
" 40 " " 50				50	" 90 " " 100			1 00

The sender of a money order must state the particulars thereof upon a form furnished by the post-office.

A money order may be endorsed once only.

The person who presents a money order for payment must be identified if unknown to the postmaster, unless the remitter upon his application waives identification.

A domestic money order may be repaid within a year at the office of issue. The fee will not be refunded.

Duplicates of lost or invalid money orders are issued by the department free of charge upon application made through the issuing or paying postmaster by remitter, payee or indorsee.

The issue of money orders on credit is prohibited.

A money order may be paid to a second person by endorsement of payee, or upon a written order or power of attorney to be filed with the paying postmaster.

A duplicate cannot be obtained of a postal note lost or destroyed.

An invalid postal note, that is, one not paid within three months from the last day of month of issue, will be replaced at an extra charge of three cents, by a duplicate issued by the department, to be applied for through the postmaster at any money order office. The invalid note must accompany the application.

International money orders may be drawn for payment in the following countries and places:

Order Should be Sent by Remitter to Payee.

Alexandria, Egypt, if drawn as a French order.
Algeria.
Bahama Islands.
Beyroot, Turkey, if drawn as a French order.
British Bechuanaland, South Africa.
Canada.
Cape Colony, South Africa.
Constantinople, Turk y.
France.
Great Britain and Ireland.
Hawaiian Islands.
Jamaica.
Leeward Islands.
Newfoundland.
New South Wales.
New Zealand.
Orange Free State, South Africa.
Panama.
Queensland.
Salonica, Turkey, if drawn as a French order.
Smyrna, Turkey.
Tasmania.
Transvaal, South Africa.
Tobago, West Indies.
Tunis, Africa.
Trinidad.
Victoria, Australia.
Windward Islands.
Zanzibar, Africa, if drawn as a French order.

Order May be Kept by Remitter as a Receipt.

Accra, Gold Coast, Africa.
Aden, Arabia.
Adrianople, Turkey.
Alexandria, Egypt, if drawn as a British order.
Amoy, China.
Assab, Africa.
Austria-Hungary.
Azores.
Bagdad, Turkey.
Bassorah, or Basra, Turkey.
Bathurst, Gambia, Africa.
Belgium.
Belize, British Honduras.
Beluchistan, Asia.
Bermuda.
Beyroot, Turkey, if drawn as a British order.
British Guiana.
British Honduras.
Bunder Abbas or Gombroon, Persia.
Burmah, Asia.
Bushire, or Abu'-Shehr, Persia.
Cameroons, Cameroons, Africa.
Canton, China.
Cape Coast Castle, Gold Coast, Africa.
Ceylon.
China.
Cyprus.
Danish West Indies.
Denmark.
Egypt.
Falkland Islands.
Faroe Islands.
Foochow, China.
Gambia, Africa.
Germany.
Gibraltar.
Gold Coast Colony, Africa.
Guadur or Gwadel, Beluchistan.
Hankow, China.
Heligoland.
Hoihow, China.
Hong Kong, China.
Iceland.
India, British.
Italy.
Japan.
Jask, Persia.
Klein Popo, or Little Popo, Togo, Africa.
Lagos, Africa.
Linga, or Lingor, Persia.
Little Popo, or Klein-Popo, Togo, Africa.
Lome, Togo, Africa.
Luxemburg, Grand Duchy.
Madeira Islands.
Malacca, Straits Settlements.
Malta.
Massowah, Africa.
Mauritius.
Muscat, Arabia.
Natal, South Africa.
Netherlands.
Ningpo, China.
Norway.
Penang, Straits Settlements.
Portugal.
Rumania.
Saint Helena.
Salonica Turkey, if drawn as a British order.
Seychelle Islands.
Shanghai, China.
Sierra Leone, Africa.
Singapore, Straits Settlements.
South Australia.
Straits Settlements.
Swatow, China.
Sweden.
Switzerland.
Tangier, Morocco.
Tobago, West Indies.
Trinidad, West Indies.
Tripoli, Africa.
Turk's Island, West Indies.
Victoria, Cameroons, Africa.
Western Australia.
Zanzibar, Africa, if drawn as a British order.

RATES OF POSTAGE TO FOREIGN COUNTRIES.

UNIVERSAL POSTAL UNION.

Treaty concluded at Berne, Switzerland, October 9th, 1874.

	Cts.
Letters, per 15 grams or ½ ounce (prepayment optional, except to places marked *).	5
Postal Cards, each	2
Newspapers and other printed matter, per 2 ounces	1
Commercial papers, First 10 ounces or fraction thereof	5
Commercial papers, Every additional 2 ounces	1
Samples of merchandise, First 4 ounces	2
Samples of merchandise, Every additional 2 ounces	1
Registration Fee on letters or other articles	10

All correspondence other than letters must be prepaid at least partially.

†Correspondence paid to British Indian Frontier only.

INTERNATIONAL MONEY ORDERS are issued only to Countries or Places marked ¶.

☞ **For Places not mentioned below, not in the Universal Postal Union, see Table, page 411.**

COUNTRIES OR PLACES WHICH, WITH THE UNITED STATES, ARE COMPRISED IN THE UNIVERSAL POSTAL UNION, AND TO WHICH THE ABOVE RATES APPLY.

(*The Italics in brackets represent the Nationality of Foreign Possessions.*)

Abyssinia, East Africa.
Aden, Arabia, British P. O.
Africa (W. C.) Br. Colonies.
Africa (Fr. Port. & Sp. pos.)
Ajuda, Africa. (*Portuguese*)
Algeria, Africa. (*French.*)
Algiers, Africa. (*French.*) ¶
Alhucemas, N. Africa. (*Sp.*)
Amar, Asia. (*Spanish.*)
Amirante Islands, E. Africa.
Amoy, Hong Kong P. O.
Andorra, Rep. of (*Spain.*)
Angola, Africa. (*Portug'se.*)
Annobon Isl'd., Africa. (*Sp.*)
Antigua, Isl'd. W.I. (*British*)
Aracan, British India.
Argentine Republic.
Aruba, S. America. (*Dutch.*)
Asia (Dch., Fr., Pr. & Sp. Col.)
Colon, U. S. of Colombia.
Assinie, Africa. (*French.*)
Austria-Hungary. ¶
Azores Islands. (*Port.*) ¶
Bahama Islands. (*British.*)
Bakel, Africa. (*French.*)
Balearic Isles. (*Spanish.*)
Bali, Asia. (*Dutch.*)
Banca, Asia. (*Dutch.*)
Barbadoes, W. I. (*British.*) ¶
Barbary (Tunis & Tripoli.)
Batavia, Java, Asia. (*Dutch.*)
Bay Islands, Sp. Honduras.
Belgium. ¶
Bermuda Islds., W. I. (*Br.*)
Bien-Hoa, Coch.-China. (*Fr.*)
Billiton, Asia. (*Dutch.*)
Bissao, Africa. (*Portug'se.*)
Bogota, U.S. of Colombia.
Bolivia, South America.
Bonaire Islds., W.I. (*Dutch.*)
Borneo, Asia. (*Dutch.*)
Bourbon, Isld., Africa. (*Fr.*)
Brazil, South America.
Bulgaria, Principality of.
Burmah, British India.
Cabul, Afghan, *via* Italy. *†
Cacheo, Isld., Africa. (*Port.*)
Cambodia, Fr. P. Offices in.
Cameroons (or Kameroun), West Africa.
Canary Islands. (*Spanish.*)
Canton, Hong Kong, P. O.
Cape Verde Is., Afr. (*Port.*)
Caroline Is., Oceanica. (*Sp.*)
Carthagena, U. S. Colombia.
Casablanca, Morocco. (*Sp.*)
Celebes, Asia. (*Dutch.*)
Ceuta, N. Africa. (*Spanish.*)
Ceylon. (*British.*)
Chaffarine Is., N. Afr. (*Sp.*)
Chandernagore, India. (*Fr.*)
Chili, South America.
China, *via* Russia.
China, *via* Hong Kong.
China, *via* France.
Cochin China (French Col.in)
Colombia (U.S. of) S. Amer.
Comino, Malta. (*British.*)
Cominotto, Malta. (*British.*)
Congo (State of) W. Africa.
Constantinople, Turkey. ¶
Corisco Is., Africa. (*Sp.*)
Costa Rica, Cent'l America.
Cuba, W. I. (*Spanish.*)
Curacoa Is., W.I. (*Dutch.*)
Cyprus Island. (*British*)
Dagana, Senegal. (*French.*)
Damao, Asia. (*Portuguese.*)
Denmark. ¶
Desirade Isld., W. I. (*Fr.*)
Diu, Asia. (*Portuguese*)
Dominica Isld., W. I. (*Brit.*)
Dominica, Rep. of, W. I.
East Africa, Ger. Protectorate.
Ecuador, S. America.
Egypt, Africa. ¶
Falkland Is., S. Amer. (*Br.*)
Faroe Islands, Denmark.
Fernando Po. Is., Afr., (*Sp.*)
Finland, Gr. Duchy, Russia.
Flores, Asia. (*Dutch.*)
Foo-chow, Hong Kong P. O.
Formosa, *via* Hong Kong.
France. ¶
French Colonies, all.
Fusam-po, Corea, Jap. P.O.
Gaboon, Senegal. (*French.*)
Gambia, W. Africa. (*Br.*)
Gambier, Is., Oceanica. (*Fr.*)
Genzanshin, (Corea.) Japanese P. O. at.
Germany. ¶
Gibraltar, Spain. (*British.*)
Goa, Asia. (*Portuguese.*)
Gold Coast, W. Africa. (*Br.*)
Goree, Senegal. (*French.*)
Gozzo, Malta. (*British.*)
Grand Bassam, W. Afr. (*Fr.*)
Great Britain. ¶
Greece.
Greenland, N. America.
Grenada, Isld., W. I. (*Br.*) ¶
Grenadines Is., W. I. (*Br.*)
Guadeloupe Is., W. I. (*Fr.*)
Guadur, British India.
Guatemala, Centr. America.
Guiana, Br., Fr. and Dutch.
Hankow, Hong Kong P. O.
Hawaii, Sandwich Islands. ¶
Hayti, Isld., W. I.
Hatien, Cochin China. (*Fr.*)
Heligoland Isld., Germany.
Hindostan, British India.
Hoihow, Hong Kong P. O.
Holkar, Br. Ind. *via* Italy. †
Honduras, Br. C. America.
Honduras, Rep. C. America.
Hong Kong, China. ¶
Hungary.
Hyderabad, Ind., *via* Italy. *†
Iceland Isld., Denmark.
India, British. ¶
India (French Est'blish'ts in)

RATES OF POSTAGE TO FOREIGN COUNTRIES—*Continued.*

Ionian Isles, Greece.
Ireland.¶
Isle of Pines, Oceanica. (*Fr.*)
Italy.¶
Jamaica, Isld., W. I. (*Br.*)¶
Japan, Asia.¶
Java, Batavia, Asia (*Dutch*).
Jinsen (Corea), Jap. P. O. at
Kalgan, China, *via* Russia.
Kameroun.
Karakal, India. (*Fr.*)
Kashmir, Ind., *via* Italy.*†
Kiung-Chow, H'g K'g P. O.
Labrador.
Labuan, Philippine Isl. (*Br.*)
Ladakh, Thibet, *via* Italy.*
Ladrone Is., Oceanica (*Sp.*)
Lagos, W. Africa (*Br.*)
Larrache, Morocco. (*Span.*)
Les Saintes, Is., W. I. (*Fr.*)
Leeward Is., W. I. (*Br.*)
Liberia, Africa.
Lichtenstein, Princ. Austria.
Lombok, Asia. (*Dutch.*)
Low Islds., Oceanica. (*Fr.*)
Loyalty Is., Oceanica (*Fr.*)
Luxemburg (Gr. Duchy of).¶
Luzon, Philippine Is. (*Sp.*)
Macao Hong Kong P. O.
Macassar, Asia. (*Dutch.*)
Madagascar Isls., Afr. (Ste. Marie, Tamatave, Majunga and Ambositra, Andevorante, Fenerive, Fiaranantsoa, Foulpointe, Ivondro, Maevatanana, Mahambo, Mahanoro, Mahela, Maintirano, Mananjary, Morondava, Morotsangana, Nossi-Vé, Tananarive [also known as [Antananarivo, Vatomandry, Vohemar.
Madeira, Isld., Portugal.¶
Madura, Asia. (*Dutch.*)
Mahe, India. (*French.*)
Malacca Straits Sett's. (*Br.*)
Malta, Isld. (*British.*)
Mandalay, Br. Indian P. O.
Manila, Philippine Isls. (*Sp.*)
Mariana Is., Oceanica. (*Sp.*)
Marie Galante, Is., W. I. (*Fr.*)
Marquesas Is., Oce'ca. (*Fr.*)
Marshall Islands, Ger. Pro.
Martinique Is., W. I. (*Fr.*)
Massowah, R. Sea (It. P. O. at)
Mauritius Is., Africa. (*Br.*)
Mayotte, W. Africa. (*Fr.*)
Mazagan, Morocco. (*Span.*)
Melilla, N. Africa. (*Span.*)
Mindanao, Philip'ne Is. (*Sp.*)
Miquelon, Is., N. Am. (*Fr.*)
Mogador, Morocco (*Sp.*)
Moldavia, Roumania.
Moluccas, Asia. (*Dutch.*)
Monaco, Princip. of France.
Montenegro.
Montserrat, W. I. (*British.*)
Morocco, Fr. & Sp. P. O. in.
Mozambique, Africa. (*Port.*)
Muscat, British Indian P. O.
Mysore, Br. Ind., *via* Italy.†
Mytho, Cochin China. (*Fr.*)
Nassau, N. P. Bahamas. (*Br.*)
Natal, Africa, Brit. Col. of.
Navigators Islands. (Ger. P. O. at Apia.)
Netherlands.¶
Netherland Colonies in Asia, America and Oceanica.
Nevis, Isld., W. I. (*British.*)
New Caledonia, Ocean. (*Fr.*)
Newfoundland.
New Guinea, Oce'ca. (*Dutch.*)
New Guinea Company, Territory of, Ger. Pro.
New South Wales, including Lord Howe Island and Norfolk Island.
New Zealand, including Chatham Islands.
Nicaragua, Centr. America.
Ning-po, Hong Kong, P. O.
Norway.¶
Nossi-be, W. Africa. (*Fr.*)
Nubia, Egypt.
Obock, East Coast of Africa (French P. O. at.)
Ourga, China. *via* Russia.
Palawan, Philip'ne Is. (*Sp.*)
Panama, U. S. of Colombia.
Panay, Philip'ne Isl. (*Sp.*)
Papua, Oceanica. (*Dutch.*)
Paraguay, S. America.
Patagonia, S. America.
Pegu, British India.
Pekin, China, *via* Russia.
Penang, Straits Settlts. (*Br.*)
Penon de Gomera, N. Af. (*Sp.*)
Persia, Asia.
Persian Gulf, Br. Ind. P. O.
Peru.
Philippine Is., Ocea. (*Sp.*)
Pines, Isle of, Oceanica.
Pondicherry, India. (*Fr.*)
Porto Rico, W. I. (*Span.*)
Portugal.¶
Port. Col'o's, Asia & Africa.
Poulo-Condor, C. China. (*Fr.*)
Prince, Isld., Africa. (*Port.*)
Queensland.
Rabat, Morocco, Spa. P. O.
Reunion Isld., Africa. (*Fr.*)
Rhio-Riouw, Asia. (*Dutch.*)
Rodrigues Is., Africa. (*Br.*)
Roumania.
Russia.
Saba Islds., W. I. (*Dutch.*)
Saffi, Morocco, Span. P. O.
Saigon, Cochin China. (*Fr.*)
Salvador, Central America.
Samoan Islands (Ger. P. O. at Apia.)
Sandwich Islds., Oceanica.
San Domingo Republic, W. I.
San Marino Republic, Italy.
Senegal, W. Africa. (*Fr.*)
Senegambia, W. Africa. (*Br.*)
Servia.
Seychelles, Is., Africa. (*Br.*)
Shanghai (U. S. Postal Agency at.)
Shanghai, *via* Hong Kong.
Shanghai, *via* France.
Siam, Asia.
Sierra Leone, W. Af. (*Br.*)
Singapore, Asia. (*British.*)
Soudan, Egypt.
South Australia.
S. W. Africa, Ger. Pro.
Spain.
Spanish Colonies in Asia, Africa, America & Oce'ca.
St. Bartholomew, Is'ld, W. I. (*French.*)
St. Christopher I., W. I. (*Br.*)
St. Croix Isl., W. I. (*Dan.*)
St. Domingo, Republic, W. I.
St. Eustatius Is., W. I. (*Dut.*)
St. John Is., W. I. (*Dan.*)
St. Kitts Is., W. I. (*Br.*)
St. Lucia Is., W. I. (*Br.*)¶
St. Louis, W. Africa. (*Fr.*)
Ste. Marie Madagasc'r. (*Fr.*)
St. Martin, W. I. (*Fr. & Dut.*)
St. Pierre, W. I. (*French.*)
St. Thomas Is. W. I. (*Dan.*)
St. Thome Is.. Afr. (*Port.*)
St. Vincent, W. I. (*Br.*)¶
Staten Island, S. America.
Straits Settlem'ts, Asia. (*Br.*)
Sumatra, Asia. (*Dutch.*)
Sumbawa, Asia. (*Dutch.*)
Surinam, S. America. (*Dut.*)
Swatow, Hong Kong P. O.
Sweden.¶
Switzerland.¶
Tahiti Isld., Oceanica. (*Fr.*)
Tamatave, Madagasc'r. (*Fr.*)
Tangier, F. & Span. P. O.
Tasmania.
Tenasserim, British India.
Terra del Fuego.
Tetuan, Morocco, Sp. P. O.
Tien-Tsin, China, *via* Russia.
Timor, Asia. (*Dut. & Port.*)
Tobago Isld., W. I. (*Br.*)¶
Togo, W. Africa, Ger. Pro.
Tonquin (French P. O. in.)
Toubouai, Oceanica. (*Fr.*)
Trinidad Isld., W. I. (*Br.*)
Tripoli (Italian P. O. at.)
Tschandok, Co. China. (*Fr.*)
Tuamotou, Oceanica. (*Fr.*)
Tunis, (Fr. and Italian P. O.)
Turkey—Europe and Asia.
Turk's Island, W. I. (*Br.*)
Uruguay, S. America.
Venezuela, S. America.
Victoria.
Vingh-Long, C. China. (*Fr.*)
Virgin Isles, W. I. (*British.*)
Wallachia, Roumania.
West Indies.
Western Australia.
Yanaon, India. (*French.*)
Zanzibar, Afr., *via* Aden.*

*Regarding exceptions, see Note H., p. 406.

COUNTRIES IN UNIVERSAL POSTAL UNION WITH WHICH THE UNITED STATES HAS SPECIAL CONVENTIONS.

Canada, comprising Provinces of *British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario. Prince Edward Island, Quebec,* and *North West Territories*.....
Mexico.....

Limit of letter-weight 30 gr. or 1 oz.; *postage-rates* on all classes of mail matter; the United States domestic rates; except seeds, plants, etc., for Canada, the rate upon which is 1 cent per oz.

COUNTRIES OR PLACES NOT IN UNIVERSAL POSTAL UNION.

Prepayment is compulsory.
† The limit of payment is at port of debarkation ; for all other places, to destination.
‡ Samples are not accepted for these destinations.
§ Registration is allowed on letters and other articles. Fee, 10 cents.
‖ Registration is allowed *only* on letters. Fee, 10 cents.
¶ Money orders are issued at same rates as specified at top of page 409.
Postal cards cannot be sent from the United States to any of the following places *except* Canada.

COUNTRIES OR PLACES OF DESTINATION.	Per 15 Grams, or ½ Ounce.	Newspapers.		Other Printed Matter, Samples and "Commercial Papers."	
		Limit for Single Rate.	Postage for Single Rate.	Limit of Weig	Postage for Single Rate.
	Cts.	Oz.	Cts.	Oz.	Cts.
Africa, except Egypt, Liberia, Congo, the Transvaal, British, French, Spanish and Portuguese Colonies, the Territories of South-West Africa, and of Togo, Western Africa (German Protectorates), Tunis, and the European post-offices in Morocco, Abyssinia, and Madagascar, by British Mail.....†	10	2	2	2	
Ascension Island, S. Atlantic, British Mail...	10	2	2	2	
Basutoland, *see* Cape Colony.					
Bechuanaland, S. Africa, British Mail.....§	10	no	2	2	2
Caffraria, *see* Cape Colony.					
Cape Colony, S. Africa, British Mail.....§¶	10	2	4	2	2
China, British Mail, *via* Brindisi.....§	10	2	2	2	2
Comoro Islands (except Mayotte) Mozambique Channel.....	5	no	2	2	1
Fiji Islands, *via* San Francisco and Sydney.....†‡	5	no	2	2	2
Griqualand, *see* Cape Colony.					
Kimberly, *see* Cape Colony.					
Madagascar, except St. Marie, Tamatave, Majunga and Ambositra, Andevorante, Fenerive, Fiaranantsoa, Foulpointe, Ivondro, Maevatanana, Mahambo, Mahanoro, Mahela, Maintirano, Mananjary, Morondara, Nossi-Vé, Tananarive, Vatomandry, Vohemar, by British Mail.....†	10	2	2	2	2
Morocco, except Spanish Possessions on West Coast.....†	10	2	2	2	2
Navassa, West Indies, direct mail.....†‡	5	no	2	2	2
Navigator's Islands, Pacific†‡	5	no	2	2	2
Orange Free State, *see* Cape Colony.					
Pitcairn Island, Pacific (*no registration.*)†‡	5	no	2	2	2
St. Helena, South Atlantic, British Mail.....§	10	2	2	2	2
Samoan Islands, *see* Navigator's Islands.					
Shanghai, direct, *via* San Francisco.....‡‖	5	no	2	2	2
Transvaal, South Africa, British Mail.....§	10	no	2	2	2

PARCELS POST.

STATEMENT SHOWING THE COUNTRIES TO WHICH PARCELS MAY BE SENT; THE DIMENSIONS, WEIGHT AND RATES OF POSTAGE APPLICABLE TO PARCELS, AND THE EXCHANGE POST OFFICES WHICH DISPATCH AND RECEIVE PARCELS POST MAILS.

Names of Countries.	Allowable Weight of Parcels.			Postage.		Exchange Post Offices.		
	Greatest Length.	Greatest Length and Girth Combined.	Greatest Girth.	Greatest Weight—Pounds.	For a Parcel not exceeding 1 Pound.	For every additional Pound or fraction of a Pound.	United States.	Foreign.
Bahamas	3 feet 6 inches.	6 feet.		11	12 cts.	12 cts.	New York.	Nassau.
Barbadoes	3 " 6 "	6 "		11	12 "	12 "	"	Bridgetown.
Colombia	2 "		4 feet.	11	12 "	12 "	All offices authorized to exchange mails between the two countries.	
Costa Rica	2 "		4 "	11	12 "	12 "		
The Danish West Indies	3 " 6 "	6 feet.		11	12 "	12 "		
The Hawaiian Kingdom	3 " 6 "	6 "		11	12 "	12 "	San Francisco.	Honolulu.
Honduras (British)	3 " 6 "	6 "		11	12 "	12 "	New Orleans.	Belize.
Jamaica	3 " 6 "	6 "		11	12 "	12 "	New York.	Kingston.
Leeward Islands	3 " 6 "	6 "		11	12 "	12 "	"	St. John, Antiqua.
Mexico	2 "		4 feet.	11	12 "	12 "	All offices authorized to exchange mails between the two countries.	
Salvador	3 " 6 "	6 feet.		11	12 "	12 "		
Guiana (British)	3 " 6 "	6 "		11	12 "	12 "		
Windward Islands	3 " 6 "	6 "		11	12 "	12 "		

AMERICAN PHOTOGRAPHIC SOCIETIES.

Albany Camera Club, The—29 Steuben Street, Albany, N. Y. Organized October 21, 1887. *President*, William W. Byington; *Vice-President*, R. L. Banks; *Board of Directors*, Trevor C. Lentze, Robert Shaw Oliver, Charles L. Palmer, Charles S. Pease, J. S. Van Buren, M. H. Rochester, Dr. Howard Van Rensselaer, Dr. Samuel B. Ward, and the officers *ex-officio; Treasurer*, Karl J. Phisterer; *Librarian*, Chas. Palmer, Jr.; *Secretary*, John S. Paterson, 29 Steuben Street, Albany, N. Y. Place of meeting, 29 Steuben Street. Ordinary meetings, first Friday in each month, at 8 P.M. Special meetings may be called by the President at any time. Annual Meeting, first Friday in April. Membership: Associate, 8; active, 43; non-resident, 19; total, 70. Exhibitions, at least two, public. Lantern Slide Exhibitions are held each year. The Club was incorporated April 27, 1891.

Amateur Photographic Association, Selma, Ala.—(Formerly Y. M. C. A. Camera Club). Organized December 29, 1887. *President*, William S. Monk; *Executive Committee*, Charles E. Wallin, Fritz Reipp; *Librarian*, Charles E. Wallin; *Secretary and Treasurer*, S. Orlando Trippe, Selma, Dallas Co., Ala. Place of meeting, Wallin's Studio. Ordinary meetings, first Thursday of each month. Special meetings at call of President. Annual meeting, first Thursday in January. Membership: Active, 14. Publications, *Photographic Times, N. Y.*; *Practical Photographer* (London, England;) *Anthony's Bulletin.*

Association of German Photographers.—New York. Organized March 4, 1868. *President*, Anton Mildenberger; *Vice-President*, Karl Kutscher; *Executive Committee*, A. Esselborn, H. Borgfeld, L. Schill; *Treasurer*, G. L. Bellnitz; *Librarian*, Otto Buehler; *Secretary*, L. Schmid, 62 East 4th Street. Place of meeting, Metropolitan Assembly Rooms, 62 East 4th Street. Ordinary meetings, second and fourth Wednesday of every month, at 8 P.M. Annual meeting, second Wednesday in March. Membership: Honorary, 6; active, 42; corresponding, 1; total, 49.

Boston Camera Club, The—50 Bromfield Street, Boston, Mass. Organized October 7, 1881, as the Boston Society of Amateur Photographers; reorganized July 16, 1886, as The Boston Camera Club; incorporated April 6, 1887. *President*, Henry N. Sweet; *Vice-Presidents*, George M. Morgan, Wm. H. Drew, Edward R. Andrews: *Executive Committee*, Henry N. Sweet, George M. Morgan, William H. Drew, Edward R. Andrews, Wilbur C. Brown, F. Alcott Pratt, William O. Witherell, Charles E. Davis, Jr., J. Prince Loud, Rufus A. Bullock, William Garrison Reed, Charles H. Currier, Joseph T. Greene; *Treasurer*, F. Alcott Pratt; *Librarian*, William O. Witherell; *Secretary*, Wilbur C. Brown, 50 Bromfield Street, Boston, Mass. Place of meeting, Club Rooms, 50 Bromfield Street. Ordinary meetings, first Monday evening of each month except July, August and September, at 8 o'clock. Special meetings, at the call of the President or of five members. Annual meeting, first Monday evening in January. Membership April 1: Honorary, 3; active, 114; associate, 9; total, 126. Exhibitions, informal each month. A joint exhibition with the Society of Amateur Photographers of New York and the Photographic Society of Philadelphia in Boston, May 2d to 11th, 1892; in Philadelphia in 1893; in New York in 1894; in Boston in 1895, etc.

Bridgeton Camera Society, The—48 East Commerce Street. Organized February 3, 1890. *President*, H. A. Janvier; *Vice-President*, Geo. Hampton; *Executive Committee*, H. H. Snell, E. B. Garrison, H. W. Fithian; *Treasurer*, S. E. Bowen; *Corresponding Secretary*, F. M. McGear, Jr.; *Secretary*, Daniel Sharp, Jr. Place of meeting, 48 East Commerce Street. Ordinary meetings, first Tuesday in each month. Special meetings, when called by President. Annual meeting first Tuesday in February. Membership September 1: Active, 27. Exhibitions first Wednesday in February. Have provided for Spring, Summer and Autumn field days to compete for gold medal and other prizes.

Brooklyn Academy of Photography.—177 and 179 Montague Street, Brooklyn. Incorporated February, 1887. *President*, Frank La Manna; *First Vice-President*, Gonzalo Poey; *Second Vice-President*, Dr. John Merritt; *Trustees*, President, 1st and 2d Vice-President, Corresponding Secretary, Recording Secretary, Treasurer, Librarian, and Wm. T. Winteringham, Starks W. Lewis, William Arnold, A. S. Barney, C. M. Trowbridge; *Treasurer*, Edward H. Quantin; *Librarian*, H. Allen Smith; *Corresponding Secretary*, Harry S. Fowler, *Recording Secretary*, H. P. Sewall, No. 177 and 179 Montague Street, Brooklyn. Place of meeting 177 and 179 Montague Street. Ordinary meetings, second Wednesday in each month, at 8 o'clock P.M. Special meetings called when necessary. Annual meeting, second Wednesday in February, at 8 o'clock, P.M. Membership September 1: Active, 102; corresponding, 16; total, 118. Lantern exhibitions held monthly from October to May, or more often, if material is presented.

Brooklyn, Photographic Association of—Organized March, 1888. *President*, Chas. M. Heid; *Vice-President*, Emil Wagner; *Treasurer*, Wm. F. Eberth; *Librarian*, Jos. Sefrin; *Secretary*, Wm. Lang, Jr., 826 Lexington Avenue, Brooklyn. Place of meeting, Arion Hall, Wall Street, Brooklyn. Ordinary meetings, first and third Wednesday. Annual meeting, March, on the third Wednesday. Membership September 1: Honorary, 3; active, 34; total, 37.

Brooklyn Society of Amateur Photographers.—Organized March 22, 1889. *President*, Homer Ladd; *Vice-President*, C. M. Trowbridge; *Treasurer*, Allan Ormsbee; *Secretary*, H. P. Sewall, 101 Hicks Street, Brooklyn. Place of meeting, at members' residence. Ordinary meetings, first Thursday in each month, at 8 o'clock P.M. Annual meeting, first Thursday after first Wednesday in January. Membership; Honorary, 1; active, 15; total, 16.

Buffalo Camera Club.—Organized October 10, 1888. *President*, Dr. M. D. Mann; *Vice-President*, Mr. George R. Howard; *Board of Managers*, Dr. G. Hunter Bartlett, Mr. George J. Bailey, Mr. Charles W. Hamlin, Mr. Alfred G. Hauenstein, Mr. E. F. Hall, Dr. M. D. Mann, Mr. Charles E. Hayes, Mr. Michael J. Stark, Mr. George R. Howard; *Treasurer*, Mr. Charles E. Hayes; *Secretary*, Mr. George J. Bailey, 18 West Genesee Street, Buffalo. Place of meeting, 379 Main Street, or at Buffalo Medical College. Ordinary meetings at 8 P.M., on second Tuesday in each month. Special meetings as called. Annual meeting, second Tuesday of October in each year. Membership: Active, 41; subscribing, 1; total, 42. Exhibitions, Saturday evening about twice a month, as called, at Buffalo Medical College. Admission by card.

Camera Club of the Buchtel College, Akron, Ohio.—Organized November 10, 1890. *President*, Prof. C. M. Knight; *Executive Committee*, President, C. M. Knight; Secretary, Agnes M. Claypole; Prof. Mary B. Jewett, Prof. W. D. Shipman, Mr. James E. Cole; *Treasurer*, Mr. Chas. H. Shipman; *Secretary*, Miss Agnes M. Claypole. Place of meeting, College Camera Club Rooms, Buchtel College. Ordinary meetings, second and fourth Mondays of each month of the college year, from September to June. Outings. Annual meeting, last regular meeting of the college year. Membership September 1: Honorary, 1; active, 27; total, 28. Exhibitions, one during the third week in January, another during the third week in June.

Camera Club of Hartford, The—No. 25 Pratt Street, Hartford, Conn. Organized February 18, 1885; incorporated March 8, 1892. *President*, Dr. Geo. L. Parmele; *Corresponding Secretary*, Charles R. Nason. Address: P. O. Box 865, Hartford, Conn. *Executive Committee*, Dr. Geo. L. Parmele, Chas. R. Nason, R. A. Wadsworth, Fred. D. Berry, E. M. White, A. H. Pitkin, O. H. Hain. *Treasurer*, Fred. D. Berry; *Secretary*, R. A. Wadsworth, P.O. Box 480, Hartford, Conn. Place of meeting, No. 25 Pratt Street. Ordinary meetings, second Tuesday of each month excepting July and August. Special meetings, at the written request of five members. Annual meeting, second Tuesday in October. Membership September 1: Honorary, 6; active, 85; total, 91. Exhibitions, annual exhibition some time during the winter months. Annual outing, Decoration Day, May 30th.

Central Y. M. C. A. Camera Section.—502 Fulton Street, Brooklyn, N. Y. Organized 1888. *President*, William H. Lowery; *Vice-President*, Francis F. Braillard, Jr.; *Executive Committee*, Officers, *ex-officio; Treasurer*, William D. Johnson; *Secretary*, B. A. Burger, 31 Sterling Place, Brooklyn, N. Y. Place of meeting, "Studio," 502 Fulton Street. Ordinary meetings, second and fourth Thursday in each month, at 8.15 P.M. Special meetings on demand of any five members. Annual meeting, second Monday in January. Membership September 1: Honorary, 3; active, 40; corresponding, 5; total, 48. Publications, *Y. M. C. A. Bulletin*. Exhibitions of lantern-slides last meeting in each month. Annual exhibition of photographs and bromide enlargements in the fall.

Capital Camera Club of Washington, D. C.—Organized May, 1891. *President*, Albert Le Breton; *Vice-President*, John Everett Mitchell; *Secretary-Treasurer*, F. B. Dante; *Board of Directors*, Albert Le Breton, Dr. T. W. Sheardown, Robert Berger; *Treasurer*, E. J. Wagner, 1,216 Michigan Avenue; *Secretary*, Walter A. Morse, 20 Kemper Place. Place of meeting, The Athenæum Club, Room 48. Ordinary meetings, every third Thursday evening in each month. Special meetings, whenever called by Executive Committee. Annual meeting, December regular meeting. Membership: Honorary, 2; active, 32; total, 34. Member of International Slide Interchange.

Chautauqua Photographic Exchange Club.—Organized August, 1888. *President*, Prof. Charles Ehrmann; *Treasurer*, G. W. Hart; *Secretary*, Mrs. C. L. Pierce, 150 State Street, Brooklyn, N. Y., in the Summer months, "Elmshurst," Riverside, Conn. Annual meeting and exhibition in August at the Chautauqua Assembly Grounds. The club is a department of the Chautauqua School of Photography, and admits only her students or graduates. Exchanges are made every three months. Membership: 38.



A. H. Phillips, Photo. W. H. Bartholomew, Engraver.

A SUN PICTURE.

Camera Club of Rochester, N. Y., The—Organized December, 1889; incorporated 1890. *President*, G. H. Croughton; *Vice-President*, C. F. Hovey; *Board of Directors*, G. H. Croughton, J. L. Willard, W. G. Mitchell, A. S. Clarkner, F. A. Frick, W. F. Goor, Dr. L. A. Weigel; *Treasurer*, W. G. Mitchell; *Secretary*, J. L. Willard, 55 North Avenue, Rochester, N. Y. Place of meeting, over 62 State Street. Ordinary meetings, every alternate Friday evening at 8 o'clock. Special meetings, when called. Annual meeting, first regular in January. Membership: Honorary, 3, active, 58; total, 61. We have a demonstration in some branch of photography every regular meeting.

Case School Camera Club.—Cleveland, Ohio. Organized December, 1888. *President*, Edw. A. Phillips; *Vice-President*, Arthnr C. Spencer; *Treasurer and Recording Secretary*, Edw. H. Williams; *Corresponding Secretary*, Milton B. Punnett, Case School of Applied Science, Cleveland, Ohio. Place of meeting, Chemical Laboratory, Lecture Room, Case School of Applied Science. Ordinary meetings, Thursdays, 4 P.M. Membership: Honorary, 2; active, 23.

Chicago Camera Club.—184 Wabash Avenue, Chicago, Ill. Organized October, 1889. *President*, Dr. C. F. Matteson; *Vice-President*, Gayton A. Douglass; 2d *Vice-President*, Mrs. A. C. Badger; *Directors*, R. P. Harley, Charles Loughridge, Walter Kimbark, Dr. M. R. Brown, Mrs. F. Douglas; *Treasurer*, Thos. B. Patterson, *Librarian*, Miss Josephine Putnam; *Secretary*, E. Burton Holmes. Place of meeting, 184 Wabash Avenue. Ordinary meetings, second Tuesday of each month 8 P.M. Annual meeting, second Tuesday in April. Membership September 1: Honorary, 10; active, 106; associate, 6; total, 122. Exhibitions, one annual illustrated lecture at Recital Hall, Auditorium.

Chicago Lantern Slide Club.—48 Athenæum Building. Organized October, 1886. *President*, Charles P. Stivers; *Treasurer*, E. J. Wagner; 1216 Michigan Boulevard; *Secretary*, W. A. Morse, 20 Kemper Place. Place of meeting, The Athenæum. Ordinary meetings, third Wednesday each month 8 P.M. Annual meeting, January meeting. Membership September 1: Honorary, 2; active, 27; total, 29.

Chicago, Photographic Society of—Organized 1869. *President*, Judge James B. Bradwell; *Vice-President*, James H. Smith; *Executive Committee*, I. Maul, Bernard Eichelman, Charles E. Smith; *Treasurer* and *Secretary*, C. Gentile. Place of meeting, Camera Club. Ordinary meetings, first Wednesday in month.

Cleveland Camera Club.—Organized 1886. *President*, Frank Dorn (M. Rogers, resigned); *Vice-President*, no election yet; *Executive Committee*, A. Ogier, F. Ogier, Professor Bolten; *Treasurer*, William Dorn; *Secretary*, Robert Dayton, 5 Euclid Avenue. Place of meeting, 5 Euclid Avenue. Ordinary meetings, first and third Tuesdays. Special meetings, subject to call. Annual meeting, first Tuesday in January, unless Tuesday is the 1st, then third Tuesday. Membership: Honorary, 1; active, 35: total, 36.

College Camera Club.—Akron, Ohio. Organized November, 1890. *President*, Prof. C. M. Knight; *Secretary*, Agnes Claypole; *Treasurer*, Will. Green; *Executive Committee*, Prof. Wm. D. Shipman, Prof. Mary B. Jewett, and James Cole, with the President and Secretary of the club. Place of meeting, Club Rooms at Buchtel College. Ordinary meetings, the second and fourth Mondays of each month, except July and August. Membership: 35.

Columbia College Amateur Photographic Society.—Columbia College, New York City. Organized 1886. *President*, Henry R. Taylor; *Vice-President*, George W. Giddings; *Treasurer*, Dwight W. Taylor; *Secretary*, Harry M. Brookfield. Place of meeting, Columbia College. Ordinary meetings, first and third Fridays during college term. Membership: Honorary, 24; active, 26; total, 50. Exhibitions held regularly in Spring, about April.

Columbus Camera Club.—88½ North High Street. Organized October 6, 1884. as Columbus Amateur Photographic Association. Reorganized March 5, 1888, as Columbus Camera Club. *President*, Frank H. Howe; *Vice-Presidedt*, Prof. Jos. N. Bradford; *Board of Directors*, F. H. Howe, J. N. Bradford, F. J. Combs, J. J. Jennings, Jos. C. Hull, John Field, W. H. Miller, W. B. Kimball, George L. Graham; *Treasurer*, J. J. Jennings; *Librarian*, John Field; *Corresponding Secretary*, Jos. C. Hull, care Deshler Bank; *Recording Secretary*, Frank J. Coombs, care Cornell & Pheneger Chemical Co. Place of meeting, Dunn Building, Room 10. Ordinary meetings, third Thursday in each month. Annual meeting, third Thursday in December. Membership: Honorary, 4; active, 37; total, 41. Exhibitions, September 23d, 24th and 25th.

Cranford Camera Club.—Cranford, Union County, N. J. Organized September 13, 1888. *President*, Wm. Chamberlain; *Treasurer*, J. M. P. Joseph; *Secretary*, A. H. Plummer, Cranford, Union County, N. J. Place of meeting, Cranford. Ordinary meetings, every Saturday night. Membership: Honorary, 1; active, 7; corresponding, 4; total, 12. Exhibitions, annual, in November.

Department of Photography of the Brooklyn Institute—201 Montague Street, Brooklyn, N. Y. Organized March 29, 1889. *President*, George H. Cook; *Vice-President*, Mrs. Geo. W. Banker; *Curator*, Dr. Louis E. Meeker; *Treasurer*, P. L. Le Brun; *Secretary*, Gould W. Hart, 849 Monroe Street, Brooklyn. Place of meeting, 201 Montague Street. Ordinary meetings, every Wednesday evening from October 1st to June 1st. Special meetings, last Monday in each month. Annual meeting, last Monday in May. Membership September 1: total, 170. Exhibitions, the annual exhibition of photographs and lantern slides was held at 201 Montague Street from June 10th to 24th, 1892.

Hiawatha Camera Club of Minneapolis.—Organized September, 1891. *President*, M. G. Jennison; *Vice-President*, Prof. C. Bell; *Executive Committee and Officers*, A. L. Eidemiller, Miss F. M. Stanchfield, Dr. Twichell; *Treasurer*, Geo. B. Eustis; *Librarian*, al books and papers go to public library, open to *all*; *Secretary*, Charles A. Hoffman, 22 South 4th Street, Minneapolis, Minn. Place of meeting, Club Rooms, Public Library Building. Ordinary meetings, third Tuesday each month 8 P.M. Special meetings, call of President. Annual meeting, third Tuesday of December. Membership September 1 Active, 50; corresponding, 15; total, 65, Publications, would like to get some, do not publish any. Exhibitions, quarterly, next one is April 19, 1892, consisting of lantern slides, window and opal transparencies, transfers, aristos, and all manner of prints, etc., etc.

Hoboken Camera Club.—380 Park Avenue. Organized March 22, 1889. *President*, A. J. Thomas; *Vice-President*, G. E. Mott; *Trustees*, W. Schrader, A. Beyer and E. E. Wooley; *Board of Governors*, all

officers, Trustees and Standing Committees, which see below, represent the Board of Governors, fifteen in all; *Treasurer*, C. L. A. Beckers; *Custodian*, W. Allen; *Recording Secretary*. Geo. H. Steljes, care of Camera Club; *Corresponding and Financial Secretary*, F. Child, care of Camera Club. Place of meeting, 380 Park Avenue (Camera Building). Ordinary meetings, first Tuesday of each month, at 8.30 P.M. Board of Governors' meeting, third Friday of each month. Annual meeting, first Tuesday in March. Membership: Honorary, 5; active, 36; associate, 5; total, 46. Exhibitions, monthly exhibitions from November 1, 1891. *Standing Committees—Entertainment Committee*, R. Beyer, C. Sudhaus, A. Ruprecht and W. Sachs; *House Committee*, F. A. Muench and L. R. Trickel.

Indianapolis Camera Club, The—Indianapolis, Ind. Organized November 18, 1887. *President*, Chas. McBride; *Vice-President*, H. C. Chandler; *Executive Committee*, John T. Harris, Rembrandt Steele, Henry Koethe; *Treasurer and Secretary*, Carl H. Lieber, 33 South Meridian Street. Place of meetings, various. Ordinary meetings, first Tuesday in each month. Special meetings on call of Executive Committee. Annual meeting, November. Membership: Honorary, 1; active, 35; total, 36.

Louisville Camera Club.—Louisville, Ky. Organized April 24, 1888. *President*, Alex. Griswold; *Vice-President*, Henry Terstegge; *Executive Committee*, C. R. Peaslee, Alex. Griswold, Henry Terstegge; *Treasurer*, R. L. Stevens, 11th and Main Streets; *Secretary*, R. L. Stevens, 11th and Main Streets, Louisville, Ky. Place of meeting, south east corner of 3d and Main Streets. Ordinary meetings, second and fourth Thursday each month, 8 o'clock P.M. Special meetings, none. Annual meeting, second Thursday in February. Membership: Active, 18; corresponding, 2; total, 20. Exhibitions during the fall and winter months.

Lowell Camera Club, The—Lowell, Mass. Organized January, 1889, incorporated March, 1892. *President*, Paul Butler; *Vice-Presidents*, William P. Atwood, W. E. Badger; *Executive Committee*, George H. Stevens, Frederick T. Walsh, Charles Runels. Directors, the officers and directors constitute the Executive Committee. *Treasurer*, A. S. Guild; *Li;brarian*, W. H. Dodge; *Secretary*, Geo. A. Nelson, 81 Appleton Street, Lowell, Mass. Place of meeting, Runel's Building. Special meetings, all meetings subject to call of the President. Annual meeting, first Tuesday in March. Membership September 1: Associate, 1; active, 35; total, 36.

Lynn Camera Club, The—Club House, 40 Broad Street, Lynn, Mass. Organized January 3, 1888; incorporated December 20, 1889. *President*, Wm. H. Drew; *Vice-President*, J. N. Smith; *Executive Committee*, Wm. H. Drew, J. N. Smith, J. W. Gibboney, W. W. Griffin, E. F. Bacheller, J. W. Tapley, Wm. A. Pevear, W. B. Gifford; *Treasurer*, Edw. F. Bacheller; *Librarian*, J. W. Tapley; *Secretary, Recording*, J. W. Gibboney; *Corresponding Secretary*, W. W. Griffin, 1 Market Street. Place of meeting, Club House, 42 Broad Street. Ordinary meetings, first Thursday of each month. Special meetings, subject to call of President. Annual meeting, first Thursday in January. Membership September 1: Honorary, 1; active, 56; social, 9; associate, 3; total, 69. Exhibitions of prints in the spring.

Marlboro Camera Club.—Organized 1889. *President*, H. C. Russell; *Vice-President*, A. M. Howe; *Executive Committee*, President, Vice-

President, Secretary, and Treasurer; *Treasurer*, Murray E. Allen; *Librarian*, Miss Blanche Hoitt; *Secretary*, J. J. Otterson, Marlborough, Middlesex County, Mass. Place of meeting, at homes of members. Ordinary meetings, first Tuesday in each month. Special meetings, on call of President. Annual meeting first Tuesday in January. Membership: Honorary, 15; active, 24; total, 39.

Mattapan Camera Club.—Mattapan, Mass. Organized May, 1890. *President*, John A. Locklin; *Treasurer*, Alfred L. Karcher; *Lecturer*, Henry L. Locklin; *Secretary*, Erdmann Sonnenbrodt, P.O. Box 83, Mattapan, Mass. Place of meeting, at private residences of members, notice of time and place of meeting to be given by the Secretary. Annual meeting, first week in May. Membership September 1: Honorary, 1; active, 8; corresponding, 1; total, 10. Exhibitions, lantern exhibitions given without charge to schools, churches, and at parties of friends or members.

Millbury Camera Club.—Millbury, Mass. *President*, Geo. C. Webber, M.D.; *Vice-President*, T. D. Bristol; *Executive Committee*, T. D. Bristol, E. B. Luce, T. E. Bottomley; *Treasurer*, T. E. Bottomley; *Secretary*, T. E. Bottomley, Box 582, Millbury, Mass. Place of meeting, Natural History Rooms. Ordinary meetings, first Monday in month, at 7.45 P.M. Special meetings, when called by Committee. Annual meeting, June, first Monday. Exhibitions each year at the Agricultural Fair in September.

Minneapolis Camera Club.—Incorporated 1892. *President*, W. M. Tenney, 334 Hennepin Avenue; *Vice-President*, Wm. Channing Whitney, Loan & Trust Building; *Secretary*, A. L. Eidemiller, 300 Nicollet Avenue; *Treasurer*, Winfred C. Porter, 322 Nicollet Avenue. Meetings are held the second Wednesday of each month at the Club Rooms, 26 South Sixth Street.

Montreal Camera Club, The—Montreal, Canada.—Organized 1889. *President*, Prof. D. P. Penhallow; *Vice-President*, Albert Holden; *Executive Committee*, Alexander Henderson, Geo. R. Prowse, L. O. Armstrong, J. J. Macintosh, F. M. Cole; *Hon. Secretary-Treasurer*, Charles F. Dawson, 233 St. James Street, Montreal, Canada, P.O. Box 1970. Place of meeting, Club Rooms, Y. M. C. A. Building. Ordinary meetings, first and third Mondays in each month. Special meetings, at option of Committee. Annual meeting, first Monday in April. Membership September 1: Active, 60. Exhibitions, from time to time; no regular periods.

Mystic Camera Club.—Medford, Mass. Organized June 4, 1889; incorporated March 17, 1891. *President*, Joseph H. Wheeler; *Vice-President*, B. D. B. Bourne; *Executive Board*, B. D. B. Bourne, Chairman; Joseph H. Wheeler, Geo. S. T. Fuller, John F. Wade, Wm. E. Bentley, E. E. Sweeney, Will. C. Eddy; *Treasurer*, John F. Wade; *Librarian*, to be appointed at next meeting; *Secretary*, Geo. S. T. Fuller. Place of meeting, Odd Fellows' Hall, Medford. Ordinary meetings, first Tuesday in each month. Special meetings, third Tuesday in each month, at call of Executive Board. Annual meeting, first meeting in January. Membership September 1: Honorary, 2; active, 45; total, 47. Publications, Catalogue of annual exhibition. Exhibitions, last annual, April 7th, 8th, 9th, 1892.

Newark Camera Club.—828 Broad Street, Newark, N. J. Organized April 25, 1888. *President*, Charles Leroy; *Vice-President*, Paul Thiery *Executive Committee*, Miles T. Anson, F. M. Olds, Wm. Archibald

G. C. Gilmore, Henry Eberhardt, Col. A. J. Clark, Dr. Chas. A. Meeker, Isaac Denman, Fredk. T. Feary; *Treasurer*, Fredk. T. Feary, *Secretary*, none elected at the last annual meeting. Place of meeting; 828 Broad Street. Ordinary meetings, second and fourth Mondays of each month, 8.30 P.M. Special meetings, as called. Annual meeting, second Monday in April. Membership: Honorary 4. active, 54: corresponding, 4; total 62. Exhibitions, two public lantern exhibitions, Spring and Fall; one print exhibition; probably in November, exact date not yet settled.

New Brunswick Camera Club.—New Brunswick, N. J. Organized October 1, 1888. *President*, Prof. Peter T. Austen; *Treasurer*, George K. Parsell; *Secretary*, Dr. Harvey Iredell, New Brunswick, N. J. Place of meeting, Chemical Lecture Room of Rutger's College. Ordinary meetings, first Wednesday in each month, at 8 P.M. Special meetings, at call. Membership September 1: Total, 30.

New Orleans Camera Club.—3 Carondelet Street (up-stairs), New Orleans, La. Organized December 12, 1886; incorporated May 3, 1888. *President*, L. E. Bowman; *Vice-President*, P. E. Carriere; *Board of Directors*, L. E. Bowman, P. E. Carriere, R. S. Charles, Jr., H. C. Delery, R. H. Palfrey, G. N. Maxent, B. C. Shields, S. L. Mitchell; *Treasurer*, Horace Carpenter; *Chairman Library Committee*, S. L. Mitchell; *Secretary*, R. S. Charles, Jr., care of Illinois Central Railroad Company, P.O. Box 733, New Orleans, La. Place of meeting, 3 Carondelet Street. Ordinary meetings, every Wednesday, 7.30 P.M. Regular meetings, first Wednesday, each month, 7.30 P.M. Annual meeting, first Wednesday, November, 7.30 P.M. Membership April 1: Honorary, 12; active, 112; corresponding, 7; total, 131. Exhibitions, as members of American Lantern Slide Interchange, two public exhibitions are given each month. No regular date fixed for same. Delegate to American Photo. Conference, R. S. Charles, Jr.; Director American Lantern Slide Interchange, T. W. Castleman.

New York Camera Club, The—314 Fifth Avenue, New York. Organized 1888. Place of meeting, New York Camera Club, 314 5th Avenue. Ordinary club meetings, first Monday of each month except during the months of January, June, July, August and September. Special meetings whenever called. Trustees meetings, last Monday of each month except June, July and August, 8,30 P.M. Annual meetings, second Wednesday of January, 8.30 P.M. Membership April 1: Active, 103; corresponding, 2; total, 105. Exhibitions of prints every Spring. Lantern slide exhibitions average two per month during season, also numerous papers read and photographic demonstrations given.

Old Colony Camera Club.—Rockland, Mass. Organized February 1, 1890. *President*, David Smith; *Vice-President*, Emery Jenkins; *Treasurer*, Pearl Arnold; *Secretary*, Pearl Arnold, Rockland, Mass., P. O. Box 208. Place of meeting, Smith Block, Liberty Street. Ordinary meetings, every other Saturday evening. Special meetings, subject to call of President. Annual meeting, first Saturday in January. Membership September 1: Active, 14; total, 14.

Pacific Coast Amateur Photographic Association.—San Francisco, Cal. Organized February 19, 1892. *President*, Major W. H. Heuer, U. S. A.; *Vice President*, Alpheus Bull, Jr.; *Executive Committee*, Miss C. A. Burk, Messrs. Dewey, Church, Keyes and Darwin; *Treasurer*, C. F. Cormack; *Secretary*, G. Knight White, 89 Flood

Building, San Francisco, Cal. Place of meeting, Flood Building, San Francisco, Cal. Ordinary meetings, first Thursday after the first Monday in each month. Special meetings at the call of the President. Annual meeting in March. Membership: Honorary, 5; active, 81; corresponding, 12; total, 103. Exhibitions, annually in May, and occasionally at other times.

Photographers' Association of America.—United States. Organized 1880. *Acting President*, Frank A. Place, Chicago, Ill.; *Vice-President*, Charles Stuart, Hartford, Conn.; *Executive Committee*, F. A. Place, C. Stuart, A. Heimberger, George M. Carlisle; *Treasurer*, G. M. Carlisle, Washington, D. C.; *Secretary*, Adam Heimberger, New Albany, Ind. Place of meeting, Chicago, Ill., July 18th and 21st, 1893, 2d Regiment Armory, Washington Boulevards (West Side). Membership September 1: Total, 2,340.

Photographic Association of Canada.—Organized January 24, 1884. *President*, C. S. Cochran, Hamilton, Ont.; *Vice-Presidents*, S. J. Jarvis, Ottawa, F. Cooper, London, J. C. Walker, Toronto; *Executive Committee*, the officers; *Secretary and Treasurer*, E. Poole, St. Catharine's, Ontario. Place of meeting, Toronto. Membership, September 1: Total, about 125. Exhibitions, annual.

Photographic Society of Waterbury, The—Brown's Block, East Main Street, Waterbury, Conn. Organized May, 1888. *President*, Hiram W. Hayden; *Vice-President*, Samuel B. Hill, *Executive Committee*, Frank Welton, S. B. Hill, George S. Husker; *Treasurer*, E. W. Mooring, Jr.; *Librarian*, Executive Committee has charge of rooms and all books and papers; *Secretary*, George S. Husker, 19 North Street, Waterbury, Conn. Place of meeting, Brown's Block, East Main Street. Ordinary meetings, first and third Tuesdays, at 8 P.M. Special meetings, on call of President or on demand of five members. Annual meeting, first Tuesday in April. Membership September 1: Active, 31; corresponding, 3; total, 34. Exhibitions, Spring and Fall print exhibitions; lantern slide exhibitions every second week, from November 1st to May 1st.

Photographic Club of Baltimore City, The—Baltimore, Md. Organized May, 1891. *President*, Harry D. Williar; *Vice-President*, Frank M. Clotworthy; *Board of Directors*, Harry D. Williar, Frank M. Clotworthy, Alex. J. Godby, George L. Smith, Henry Stockbridge, Jr., Charles Quartley, F. W. McAllister, A. S. Murray, W. D. B. Penniman, T. B. Gresham, F. A. Noble, W. H. Corner; *Treasurer*, F. A. Noble; *Secretary*, Geo. L. Smith, 1214 N. Calvert Street, Baltimore, Md. Place of meeting, corner Madison and Eutaw Streets. Ordinary meetings, first Tuesday of each month. Special meetings every Tuesday. Annual meeting, first Tuesday in October. Membership September 1: Associate, 62; active, 64; corresponding, 3; total, 129. Publications, none except in journals. Exhibitions, about every three weeks. The Club belongs to the International Interchange of Lantern Slides and has exhibitions as often as the slides arrive.

Photographic Section of the American Institute.—Organized March 26, 1859. *President*, Henry J. Newton; *Vice-President*, Cornelius Van Brunt; *Executive Committee*, officers of the Section; *Treasurer*, Edward Schell; *Librarian*, John W. Chambers; *Secretary*, Oscar G. Mason, Photographic Department, Bellevue Hospital, New York City. Place of meeting, Institute Hall, 111, 113, 115 West 38th Street. Ordinary meetings, first Tuesday in each month except July and August

at 8 o'clock P.M. Special meetings, upon call of officers. Annual meeting, first Thursday in February, at 8 o'clock P.M. Membership September 1: Total, about 2,000. Exhibitions, October and November, 1892. All members of the Institute are by virtue of such membership also members of the various sections.

Photographic Section of the Manhattan Chapter Agassig Association.—Organized 1890. *President*, Edward B. Miller; *Vice-President*, Frederick Schneider; *Board of Trustees*, E. B. Miller, C. F. Groth, W. T. Demarest, W. S. Miller, H. T. Rowley, F. Kromm, H. Bucher, Jr., A. Nehrbas, J. Benemann; *Treasurer*, William S. Miller; *Librarian*, Charles Miller; *Secretary*, William T. Demarest, 124 West 90th Street, New York City. Place of meeting, 141 East 40th Street, New York City. Ordinary meetings, once each month as announced. Special meetings, when called by the Board of Trustees. Annual meeting, January meeting. Membership May 1: Active, 51; total, 51. Publications, monthly bulletin. Exhibitions, print exhibition in spring of each year, usually in May. Lantern slide exhibition in autumn.

Photographic Section of Society of Natural History (Cincinnati Camera Club).—Organized January 24, 1884. *President*, T. B. Collier; *Vice-President*, A. L. Fogg; *Board of Managers*, officers of society; *Treasurer*, M. A. High; *Librarian*, A. I. Carson; *Secretary*. Edward E. Shipley, 61 West 3d Street, Cincinnati, Ohio; *Corresponding Secretary*, T. H. Kelly. Place of meeting, 108 Broadway. Ordinary meetings, second and fourth Mondays each month, at 8 P M. Special meetings, on call of President. Annual meeting, second Monday in April. Membership, September 1: Honorary, 1; active, 137; total, 138. Exhibitions, one print exhibition and one lantern exhibition, open to public; exhibition of interchange slides, fourth Monday in each month.

Pittsburgh Amateur Photographers' Society, The—Academy of Science and Art. Organized May 11, 1885. *President*, W. S. Ball; *Vice-President*, W. S. Clow; *Executive Committee*, L. S. Clarke, C. C. Croft, H. R. Moorhead, O. H. Darlington, W. S. Clow; *Treasurer*, W. J. Hunker; *Librarian*, George D. Heisey; *Secretary*, Jos. H. Hunter, 248 Centre Avenue, Pittsburgh, Pa. Place of meeting, Academy of Science and Art. Ordinary meetings, second Monday of each month, 8 P.M. Special meetings, when called by the President or any three members in good standing. Annual meeting, second Monday in April. Membership September 1: Honorary, 2; active, 51; total, 53. Exhibitions, April of each year. This year's exhibition postponed until 10th day of May, 1892.

Plainfield Camera Club, The—Organized June 7, 1888; Incorporated September 13, 1890. *President*, O. S. Teale; *Viae-President*, G. H. Babcock; *Board of Directors*, O. S. Teale, G. H. Babcock, G. E. Greenleaf, W. H. Lyon, Jr., J. B. Platt, J. E. Stewart, Harold Serrell, *Treasurer*, W. H. Lyon, Jr.; *Secretary*, G. E. Greenleaf, Plainfield, N. J. Place of meeting, Clarkson Building, 17 East Front Street. Ordinary meetings, first and third Tuesdays in each month. Special meetings at call. Annual meeting, third Tuesday in December. Membership: Honorary, 3; active 51; total, 54. Exhibitions: November, 1891, and April, 1892. Members of other clubs or societies are always welcome to our rooms.

Providence Camera Club.—87 Weybosset Street, Providence R. I. Organized September, 1883. *President*, R. Clinton Fuller; *Vice-President*, L. L. Anderstrom; *Executive Committee*, R. C. Fuller, A. B. Ladd, C. E. Hudson, J. Miller, Jr., C. A. Stoddard, H. J. Reynolds. E. Q. Gladding, H. B. Cottelle, H. B. Deming; *Treasurer*, Arthur B. Ladd; *Librarian*, S. B. Burnham; *Secretary*, Joseph A. Miller, Jr., 87 Weybosset Street, Providence, R. I. Place of meeting, 87 Weybosset Street, Providence, R. I. Ordinary meetings, first Saturday and the Tuesday after the third Saturday of each month, at 8 P.M. Special meetings at call of President, or at the written request of any five members. Annual meeting, first regular meeting in March. Membership: Active, 51; associate, 4; total, 55. Annual exhibitions in May. Lantern slide exhibitions monthly, from September 1st to July 1st.

Photographic Society of Philadelphia, The—10 South Eighteenth Street. Organized 1862. *President*, Joseph H. Burroughs; *Vice-Presidents*, Edmund Stirling, Charles R. Pancoast; *Board of Directors*, five officers and: John C. Browne, Charles L. Mitchell, M.D., John G. Bullock, William H. Rau, Frederick E. Ives Samuel Sartain, George M. Taylor, John Carbutt; *Treasurer*, George Vaux, Jr.; *Secretary*, Robert S. Redfield, 1601 Callowhill Street. Place of meeting, 10 South 18th Street. Stated meetings, second Wednesday evening of each month, at 8 P.M., except July, August and September. Conversational meetings, fourth Wednesday evening of each month. Annual meeting, second Wednesday evening in April. Membership: Active and life, 205. Exhibitions, annual, in connection with Boston Camera Club and Society of Amateur Photographers of New York, also an annual exhibition confined to work of members.

Postal Photographic Club.—Headquarters, West Chester, Pa. Organized 1885. Reorganized 1889. *President*, Randall Spaulding, Montclair, N. J.; *Treasurer, Librarian and Secretary*, Dr. J. Max Mueller, West Chester, Pa. Membership: Active, 30. Publications, monthly albums and note books containing photos from members.

Quebec Camera Club.—Quebec City. Organized March 7, 1887. *Vice-President*, Captain J. George Garneau; *Executive Committee*, Capt. W. E. Imlah, J. B. Amyot, W. E. Russell; *Treasurer*, James Brodie; *Secretary*, Capt. Ernest F. Würtele, Quebec, Montmorency and Charlevoix Railway Co., Quebec, Que. Place of meeting, Captain Imlah's quarters, Citadel. Annual meeting, second Monday in December of each year.

Rochester Photographic Association.—Organized January 3, 1889. *President*, Dr. L. A. Weigel; *1st Vice-President*, C. Fred. Hovey; *2d Vice-President*, Dr. John C. Proctor; *Board of Directors*, Dr. L. A. Weigel, J. L. Willard, H. W. Mathews, C. Fred Hovey, A. S. Clackner, F. A. Frick, J. G. Meyer; *Treasurer*, J. S. Willard; *Secretary*, Jonathan G. Meyer, Post Office, Rochester, N. Y. Place of meeting, over 62 State Street. Ordinary meetings, Friday evenings alternately, at 8 o'clock. Special meetings, subject to President's call. Annual meeting, first Friday in January. Membership September 1: Honorary, 5; active, 55; total, 60. Exhibitions, irregular or semi-occasionally.

Schuylkill Camera Club.—Pottsville, Penna. Organized July 5, 1889. *President*, S. A. Thurlow; *Vice-President*, Miss Elena Roads; *Executive Committee*, S. A. Thurlow, Miss Elena Roads, B. S. Simonds, W. L. Sheafer; *Treasurer*, W. L. Sheafer; *Librarian*, B. S. Simonds;

Secretary, B. S. Simonds. Place of meeting, "The Orchard," Pottsville, Schuylkill Co., Penna., "Club Rooms," Second and Marshall Streets. Ordinary meetings, last Friday in each month. Special meetings at the call of the Executive Committee. Annual meeting, May. Membership September 1: Honorary, 4; active, 65; corresponding, 4; total, 73. Exhibittons every two weeks from December to June. Member of "American Photo Conference Slide Exchange."

Society of Amateur Photographers of New York, The—No. 111, 113 & 115 West 38th Street. Organized March 28, 1884. *President*, R. A. B. Dayton; *Vice-President*, L. B. Schram; *Recording Secretary*, T. J. Burton; *Corresponding Secretary*, W. F. Hapgood; *Treasurer*, C. C. Roumage; *Board of Directors*, James H. Stebbins, Jr.; R. L. Bracklow, J. Wells Champney, F. C. Elgar, E. Warrin, H. S. Mack, James Spies, H. A. Smith. Place of meeting, No. 111, 113 & 115 West 38th Street. Ordinary meetings, second Tuesday in each month. Special meetings, when called. Annual meetings, second Tuesday in April. Membership April 1: Honorary, 14; active, 152; subscribing, 41; corresponding, 59; total, 266. Exhibitions, at American Institute Fair, September.

Springfield Camera Club.—465 Main Street, Springfield, Mass. Organized 1886. *President*, John Leshure; *Executive Committee*, John Leshure, R. W. Adams, M. D. Fletcher, H. C. Haile, C. A. Emery; *Treasurer*, H. C. Haile; *Librarian*, M. D. Fletcher; *Room Committee*, John Leshure, H. Smith, Jr., W. M. Lester; *Secretary*, R. W. Adams, P.O. Box 1528, Springfield, Mass. Place of meeting, 465 Main Street. Ordinary meetings, third Wednesday of each month, 7.30 P.M. Special meetings, at call of Executive Committee. Annual meeting, October. Membership September 1: Honorary, 4; active, 48; total, 52. Exhibitions, annual print exhibition in the fall.

Stevens' Photographic Society.—Stevens' Institute of Technology, Hoboken, N. J. Organized 1889. *President*, James V. Macdonald; *Vice-President*, A. G. Kollstede; *Treasurer*, D. W. Blake; *Secretary*, Robert E. Hall, Stevens Institute of Technology, Hoboken, N. J. Place of meeting, Stevens Institute. Ordinary meetings, first week of every month. Annual meeting, first week in October. Membership September 1: Active, 30. Exhibitions, one in the Fall and one in the Spring.

St. Louis Camera Club.—Club Rooms, Vandeventer Place, corner of Vandeventer Avenue. Organized 1885; incorporated 1889. *President*, John B. Holman, 714 Walnut Street; *Vice-President*, John W. Dunn, 3418 Meramac Street; *Executive Committee*, Henry B. Alexander, of Lantern-slide Committee; Charles M. Alexander, of Membership Committee; Julian Laughlin, of House Committee; the President and Vice-President *ex officio* members; *Secretary and Treasurer*, William M. Butler, 2636 Osage Street; *Assistant Secretary*, Frank Hickman, 404 Market Street. Place of meeting, Club Rooms, Vandeventer Place, corner Vandeventer Avenue. Ordinary meetings, first and third Tuesdays in each month. Special meetings, at call of President. Annual meeting, first Tuesday in April. Membership Honorary, 12; active, 55; associate, 4; total. 71. The annual field day occurs in May; prizes are awarded for the best work done on that day.

Syracuse Camera Club.—322 South Salina Street. Organized October 22, 1886. *President*, J. D. Pennock; *Vice-President*, John R. Clancy; *Executive Committee*, J. D. Pennock, John R. Clancy, S. W. Rose, William H. Olmsted, R. Wynyard Bellhouse; *Treasurer*, S. W. Rose, *Secretary*, R. Wynyard Bellhouse, 41 White Memorial Building, Syracuse, N. Y. Place of meeting, 322 South Salina Street. Ordinary meetings, every Friday. Annual meeting, first Friday in January. Membership: Associate, 13 · active, 78; total, 91.

"Tech" Camera Club of the Worcester Polytechnic Inst., The—Worcester, Mass. Organized September 28, 1889. *President*, Edward W. Vail, Jr.; *Vice-President*, Henry N. Smith; *Executive Committee*, Edward Keith, Howard Bracken, A. H. Smith, A. C. Higgins, Everett Kent, Harry Sinclair; *Treasurer*, Howard A. Coombs; *Keeper*, Edward H. Keith; *Secretary*, Harry Sinclair, P.O. Box, 834, Worcester. Place of meeting, Boynton Hall. Ordinary meetings, once in two weeks, Saturday, P.M., 7.45, beginning the second Saturday of the school year. Special meetings, at the call of the Executive Committee. Annual meeting, September, third week. Membership September 1: Honorary, 5; active, 20; corresponding, 2; total, 27. Exhibitions are held at the school during the fall term of each year.

Toledo Camera Club, The—Toledo, Ohio. Organized December 3, 1890. *President*, F. C. Wade; *Vice-President*, Rev. C. Scodding; *Executive Committee*, F. C. Wade, Rev. C. Scodding, C. H. Walbridge, H. J. Colburn, and M. A. Martin; *Treasurer*, M. A. Martin; *Librarian*, E. M. Harter; *Secretary*, M. A. Martin, 602 Summit Street, Toledo, Ohio. Place of meeting, Club Rooms, Sheridan Block. Ordinary meetings, first Monday in every month. Special meetings, called by President. Annual meeting, first Monday in December. Membership September 1: Honorary, 4; active, 50; total, 54. Exhibitions, annual, second week in January. Lantern slide exhibitions given nearly every monthly meeting.

Toronto Amateur Photographic Association.—Toronto, Canada. Organized 1887. *President*, Frank Manchee; *Vice-President* Dr. Ellis; *Executive Committee*, W. B. McMurrich, J. S. C. Bethune, A. W. Croil, T. Langdon, Hugh Neilson, R. Muntz, Charles Riggs; *Treasurer*, R. S. Clark, Imperial Bank; *Secretary*, E. Havelock Walsh, 219 Beverley Street. Place of meeting, College of Physicians and Surgeons. Ordinary meetings, every Monday evening, from 1st September to 1st May. Special meetings, first Monday in each month. Annual meeting, first Monday in October. Membership: Total, 60. Exhibitions occasionally.

Yonkers Photographic Club, The—Hawthorne Hall, Yonkers, N.Y. Organized February 8, 1889. *President*, John W. Alexander; *Board of Directors*, John W. Alexander, F. W. R. Eschmann, George B. Ritter, George S. Pentz, Edward T. Sherman, George B. Wray, Eugene D. Gardner; *Treasurer*, George B. Wray; *Secretary*, E. D. Gardner, 138 Buena Vista Avenue, Yonkers, N. Y. Place of meeting, Hawthorne Hall, Yonkers, N. Y. Ordinary meetings, first Monday of each month, at 8 P.M., club night. Social and informal meetings, Monday evenings. Special meetings may be held at any time at the call of the Board of Directors, or whenever it is requested in writing by 10 active members. Annual meeting, last Monday in April of each year. Membership: Active, 45; corresponding, 6; total, 51. Exhibitions, annual print exhibition in May.

FOREIGN PHOTOGRAPHIC SOCIETIES.

Great Britain and British Colonies.

Amateur Photographic Association.—London, S. W. Place of meetings, 58 Pall Mall. Secretary, Arthur James Melhuish.

Amateur Photographic Association of Victoria.—Melbourne, Australia. Time of meeting, second Monday in each month. Hon. Secretary, J. H. Harvey, 59 Hotham Street, East Melbourne.

Arbroath Amateur Photographic Association.—Brothock Bridge, Arbroath. Ordinary meetings, last Tuesday of month. Place of meeting, association's rooms, Brothock Bridge. Secretary, George K. Reid, 214 High Street, Arbroath.

Albany Institute Amateur Photographic Society.—Camberwell, London. Ordinary meetings, alternate Thursdays, commencing with second Thursday in January, 8 o'clock, P.M. Place of meeting, Albany Institute. Secretary, W. A. B. Gee, 3 Welby Street, Camberwell, London, S. E.

Auckland Photographic Club.—Auckland, New Zealand. Secretary, G. R. Boulton, Bank of New South Wales. Place of meeting, Australian Mutual Provident Society's Building, Queen Street. Ordinary meetings, second and Friday in each month. Annual meeting, October.

Barnstaple and North Devon Photographic Society.—Barnstaple, North Devon. Ordinary meeting, first Wednesday in each month, at 7.30 P.M. Place of meeting, North Devon, Athenæum, Barnstaple. Secretary, Arthur C. King, 18 Hills View, Barnstaple, North Devon.

Bolton Photographic Society.—10 Rushton Street (off Corporation Street), Bolton. Ordinary meetings, first Tuesday in every month. Place of meeting, 10 Rushton Street. Secretary, C. A. Mackechim, M. B., 355 Blackburn Road, Bolton-le-Moors.

Blackburn and District Photographic Society, The—Royal Chambers, Victoria Street, Blackburn, Lancashire. Ordinary meetings, last Thursday in each month, at 8 P.M. Place of meeting, 33 Victoria Street, Blackburn. Secretary, W. B. Burrows, 20 Richmond Terrace, Blackburn.

Bath Photographic Society.—Royal Literary and Scientific Institution Terrace Walks. Organized 1888. Secretary, W. Middleton Ashman, 12a Old Bond Street, Bath. Place of meeting, Royal Literary and Scientific Institution. Ordinary meetings, last Wednesday in the month, October to April inclusive, 8 P.M. Annual meeting, last Wednesday in February. Membership: total, 50.

British Association for the Advancement of Science.—Edinburgh. London office, Burlington House, Piccadilly, W. General Secretaries, Captain Sir Douglas Galton, K.C.B., D.C.L., LL.D., F.R.S., F.L.S., F.G.S., F.R.G.S.; A. G. Vernon Harcourt, Esq., M.A., D.C.L., LL.D., F.R.S., F.C.S; local secretaries for the meeting at Edinburgh, Professor G. F. Armstrong, M.A., C.E., F.R.S.E., F.G.S.; F. Grant Ogilvie, Esq., M.A., B.Sc., F.R.S.E.; John Harrison, Esq.

Birmingham Photographic Society.—Colonnade Hotel, Birmingham. Secretary, I. T. Mansley, 26 Portland Road, Edgbaston, Birmingham. Ordinary meetings, every Tuesday, Club room. Special meetings, first and second Thursdays, Lecture room, Midland Institute.

Brechin Photographic Association.—Brechin, N. B. Rooms, 14 St. Mary Street. Secretary, James D. Ross, 6 High Street, Brechin, Scotland. Place of meeting, 14 St. Mary Street. Ordinary meetings, third Wednesday of each month, at 8.15 P.M. Special meetings, when required. Annual meeting, third Wednesday of September.

Brighton Photographic Society.—Brighton. Ordinary meetings, second and fourth Tuesdays, at 8.15 P.M. Place of meeting, Arch 40, Ship Street Gap. Secretary, A. H. C. Corder, 77 Buckingham Road, Brighton.

Bristol and West of England Amateur Photographic Association.—Ordinary meetings, second Friday in each month. Place of meeting, Literary and Philosophic Club, 28 Berkeley Square, Bristol. Hon. Secretary, Frederick Bligh Bond, Liverpool Chambers, Corn Street, Bristol.

Bury Photographic and Arts Club.—Bury, Lancashire. Secretary, Roger Wood, 190 Bolton Street, Bury, Lancashire. Club Rooms, 11 Agar Street, Bury. Ordinary meetings, third Wednesday in each month, at 7.30 P.M. Special meetings, first and second Wednesday and fourth Tuesday in each month. Annual meeting, fourth Wednesday in September.

Camera Club.—Charing Cross Road, W. C. Organized 1885. Secretary, G. Davison, Camera Club, Charing Cross Road, W. C. Place of meeting, Camera Club.

City of Belfast Y. M. C. A. Camera Club.—Rooms, 14 Wellington Place. Ordinary meetings, last Monday of each month. Place of meeting, 14 Wellington Place. Secretaries, James H. Hamilton, 3 Eden Terrace, Shankhill Road; James McCleery, 63 Royal Avenue.

Croydon Camera Club.—56 George Street, Croydon, Surrey. Secretary, Geo. R. White, 55 Albert Road, Croydon, Surrey. Place of meeting, 56 George Street. Ordinary meetings, alternate Mondays, 8 P.M. (Conversational), every Friday, 8 P.M. Annual meeting, February.

Darlington Photographic Society.—County Durham. Ordinary meetings, second Monday in each month, 8 P. M. Place of meeting, Trevelyan Hotel, Darlington. Secretary, P. W. Poster, Elenbank, Darlington.

Devon and Cornwall Camera Club.—Plymouth, Devon, England. Secretary, J. Hansford Worth, C. E., 42 George Street, Plymouth. Place of meeting, the Athenæum, Plymouth. Ordinary meetings, alternate Mondays from September to March inclusive, at 7.30 P.M. Special meetings take place during the summer months and organized excursions. Annual meeting, 1st September.

Dewsbury Amateur Photographic Society.—Malkroyd Lane Dewsbury. Ordinary meetings, second Thursday in each month. Place of meeting, Dewsbury and District Technical School. Secretary, George Kilburn, 51 Eastfield, Batley Carr, Dewsbury.

Enfield Camera Club.—Waldron House, Southbury Road, Enfield. Ordinary meetings, second and fourth Wednesday each month, at 8 o'clock. Place of meeting, Waldron House, Southberry Road, Enfield. Secretary, James Dudin, "Roseneath," Chase Green Ave., Enfield.

Edinburgh Photographic Club.—5 St. Andrew Square. Ordinary meetings, third Wednesday of each month. Honorary Secretary, G. G. Mitchell, 139 Dalkeith Road.

Ealing Photographic Society.—Ordinary meetings, first and third Thursdays in October to April inclusive. Place of meeting, the public buildings, Ealing. Secretary, F. H. Williams, A.R.I.B.A,, the Chantry, Florence Road, Ealing.

Exeter Amateur Photographic Society.—City Chambers, Gandy Street, Exeter. Secretary, Rev. John Sparshatt, M.A., Fairfield House, Alphington Road, Exeter. Place of meeting, City Chambers, Gandy Street. Ordinary meetings, April to September, first Tuesday in each month, October to March, first and third Tuesdays. Annual meeting, first Tuesday in January.

Faversham Institute Photographic Society, The—Ordinary meetings, the third Tuesday in every month. Place of meeting Faversham Institute, Kent. Secretary, Percy Dan, 44 East Street, Faversham.

Falkirk Amateur Photographic Association.—Ordinary meetings, in winter, every month. Place of meeting, Newmarket Street. Secretary, John B. Walls, Robertswynd, Falkirk.

Foo Chow Camera Club.—Foo-Chow, China. Hon. Secretary, J. Mencarini.

Glasgow Photographic Association.—Glasgow. Secretary, Fred. Mackenzie, 122 Wellington Street, Glasgow. Place of meeting, Philosophical Society's Rooms, 207 Bath Street.

Glasgow and West of Scotland Amateur Photographic Association.—Glasgow. Ordinary meetings, third Monday of month, October to April. Conversation meeting every Monday evening throughout the year. Place of meeting, rooms of the Association, 180 West Regent Street. Secretaries, William Goodwin and J. C. Oliver, 180 West Regent Street, Glasgow.

Glenalmond Photographic Club.—Trinity College, Glenalmond, Perthshire. Secretary, E. H. Cunninghambraig, Esq., Trinity College, Glenalmond, Perthshire. Place of meeting, Trinity College, Glenalmond. Ordinary meetings, alternate Saturdays, 9 P.M. during term time. Special meetings may be called by Committee at any convenient time.

Glossop Dale Photographic Society, The—Howard Street, Glossop, Derbyshire. Ordinary meetings, Tuesday, Thursday and Saturday, weekly. Council meeting, first Wednesday each month at 8 P.M. Place of meeting, Howard Street Chambers (offices of society.) Secretary, J. K. Hollingbery, Howard Street, Glossop, near Manchester.

Guildford Photographic Society. — Secretaries, Messrs. A. W. Bullen and J. H. Nunn, 115 High Street, Guildford. Place of meeting, Society's Rooms, Chapel Street, Guildford. Ordinary meetings, second Tuesday in each month, at 8 P M. Special meetings, as necessary. Annual meeting, last Tuesday in March.

Harlesden and Willesden Photographic Society.—Harlesden, London, N. W. Ordinary meetings, second Tuesday in each month at 8.30 P. M. Place of meeting, Court House, Harlesden. Secretary, Isaac Cohen, 26 Wendover Road, Harlesden, London, N.W.

Herefordshire Photographic Society.—Secretary, John Parker, C.E., City Surveyor, Mansion House, Hereford ; Assistant Secretary, E. G. Davers, Mansion House, Place of meeting, Mansion House, Hereford. Ordinary meetings, summer, first Thursday in each month; winter meetings, first Tuesday in each month.

Hackney Photographic Society.—Hackney, London, N.E. Secretary, W. Fenton-Jones, F.S.Sc., 12 King Edward Road, Hackney, London, N.E. Place of meeting, 206 Mare Street, Hackney. Special meetings, when required. Annual meeting, first meeting in May.

Holmfirth Amateur Photographic Society.—Secretary, David Bilson, Birchin House, Holmfirth, Yorkshire. Ordinary meetings are held at member's houses last Friday in each month.

Keighley Photographic Association.—Secretary, John Gill, 27 Highfield Lane, Keighley. Place of meeting, Mechanics Institute, North Street. Ordinary meetings, first and third Tuesdays in each month, October to March. Summer months, special meetings, monthly. Annual meeting, February.

Kendal Literary and Scientific Institution, Photographic Section.—Secretary, Charles E. Greenall, Thorny Hills, Kendal. Place of meeting, Museum Library.

Ipswich Photographic Society.—Ordinary meetings, second Wednesday in month, at 8 P.M. Place of meeting, Art Gallery, Ipswich. Secretary, Leonard Hill, Ashdown, Foxhall Road, Ipswich.

Jersey Amateur Photographic Society.—Channel Islands, Great Britain. Ordinary meetings, first Wednesday in month for papers, etc. Place of meeting, 21 Grove Place, Jersey. Secretary and Librarian, F. Woodland Toms, F.I.C., F.C.S., 21 Grove Place, Jersey.

Lancaster Photographic Society, The — Lancaster (England). Secretary, W. Briggs, 21 Cheapside, Lancaster, England. Place of meeting, Springfield Barracks. Ordinary meetings, on the last Tuesday in each month, at 8 P.M.

Lantern Society, The—London. Hon. Secretary, Commander C. E. Gladstone, R.N., 6 Bolton Street, W. Place of meeting, 20 Hanover Square, W. Ordinary meetings, second and fourth Mondays in each month, from October to April, at 8 P.M.

Leamington Amateur Photographic Society, The—Secretaries, Signor Aspa, Priory House, Leamington, and B. Magrath, Esq., Clarendon Square, Leamington. Place of meeting, Trinity Church Schoolroom, Leamington. Ordinary meetings, on Fridays, fortnightly, at 5.30 P. M.

Leeds Photographic Society.—Leeds, Yorkshire, England. Joint Secretaries, Herbert Denison and Robert Steele, 12 East Parade, Leeds. Place of meeting, Leeds Mechanics' Institute. Ordinary meetings, first Thursday in each month, and third Monday in each month. Annual meeting, first Thursday in December.

Leicester and Leicestershire Photographic Society.—Secretary, Henry Pickering, High Cross Street, Leicester. Place of meeting, Mayor's Parlor, Old Town Hall. Ordinary meetings, second Wednesday in October, November, December, January, February, March, April, May. Out-door meetings, June, July, August, September. Annual meeting, second Wednesday in January.

Leith Amateur Photographic Association.—Secretary, Alexander Pitkethly, 8 Wilkie Place, Leith. Place of meeting, Goalen's Hall, Leith. Ordinary meetings, last Tuesday of each month. Special meetings, members work exhibition, last Tuesday November. Annual meeting, last Tuesday in January.

Manchester Amateur Photographic Society, The—Hon. Secretary, Randolph Gilmore, 1B Cooper Street. Place of meeting, Manchester Athenæum. Ordinary meetings, second Tuesday in each month. Annual meeting, last Tuesday in January.

Manchester Photographic Society.—36 George Street, Manchester. Ordinary meetings, second Thursday in each month. Place of meeting, 36 George Street, Manchester. Hon. Secretary, W. Holker Farrow, 58 Greenhey's Lane, Manchester.

Morley and District Amateur Photographic Society.—Ordinary meetings, first Wednesday in each calendar month. Place of meeting, M. and D. A. P. S's. rooms, Chapel Hill, Morley. Secretary, Harold E. Spafford, 12 Parliament Street, Morley, Leeds.

Newcastle-on-Tyne and Northern Counties Photographic Association. — Secretary, Edgar G. Lee, 11 Beverley Terrace, Cullercoats, Newcastle-on-Tyne. Place of meeting, Art Gallery, Newcastle. Ordinary meetings, second and fourth Tuesday in each month except May, June, July, August and September, at 7.30 P.M., during these latter months out-door meetings are held. Annaal meeting, second Tuesday in January.

North Kent Amateur Photographic Society, The—Gravesend, Kent. Treasurer-Secretary, G. W. Cobham, P.A.S.I., 3 Edwin Street, Gravesend. Place of meeting, Gravesend. Ordinary meetings, second Thursday in each month, at 8 P.M. Special meetings, as required. Annual meeting, second Thursday in January, at 8 P.M.

North Middlesex Photographic Society.—Jubilee House, Hornsey Road, London. Ordinary meetings, second and fourth Mondays in each month, except July and August; in those months, the second Mondays only, at 7.30 P.M. Place of meeting, Jubilee House, Hornsey Road. Secretary, J. McIntosh, 14 Lowman Road, Holloway, London, N.

Nottinghamshire Amateur Photographic Association.—Association Chambers, 32 Market Street, Nottingham. Ordinary meetings, alternate Mondays, at 8 P.M. Place of meeting, association rooms. Secretary, P. E. Knight, Java Villa, Blythe Street, Mapperley, Nottingham.

Oldham Photographic Society.—Hon. Secretary, Thomas Widdop, 16 Burnaby Street, Oldham. Meetings are held at the Lyceum, Union Street. Ordinary meetings every Thursday. Annual meeting held on the last Thursday in October.

Oxford Photographic Society, The—(Rooms), 136 High Street, Oxford, England. Secretaries, F. A. Bellamy, F.R. Met. Soc. (London), and J. H. H. Minn, official address, 136 High Street, Oxford, Great Britain. Place of meeting, usually in the Society's rooms. Ordinary meetings, first and third Tuesdays in each month, at 8 P. M. Conversational meetings, Mondays (twice a month), intermediate with the meetings. Annual meeting, first Tuesday in October, 8 P.M.

Oxford University Photographic Club.—Oxford. Secretary, J. Walker, M.A., Christ Church. Place of meeting, Club rooms, 24 Friar's Entry, Oxford. Ordinary meetings, three in every term of eight weeks.

Paisley Photographic Society.—Rooms, 9 Gauze Street, Paisley. Secretary, David B. Jack, Glencairn, Blackhall, Paisley. Ordinary meetings, on the second Tuesday of each month, from October till April. Conversational meetings every other Tuesday.

Peterborough Photographic Society. — The Museum, Minster Precinct. Secretary, A. W. Nichols, 11 Cromwell Road, Peterboro. Place of meeting, the Museum. Ordinary meetings, first Monday in each month, 8 P. M. Annual meetings, first Monday in June.

Photographic Club, The—Hon. Secretary and Treasurer, F. A. Bridge, East Lodge, Dalston Land, London, N.E. Place of meeting, Anderton's Hotel, Fleet Street, London, E.C. Ordinary meetings, every Wednesday, at 8 P. M. Lantern meeting, last Wednesday in the month. Outings every Saturday and bank holiday during the summer season. Annual meeting, first Wednesday in November.

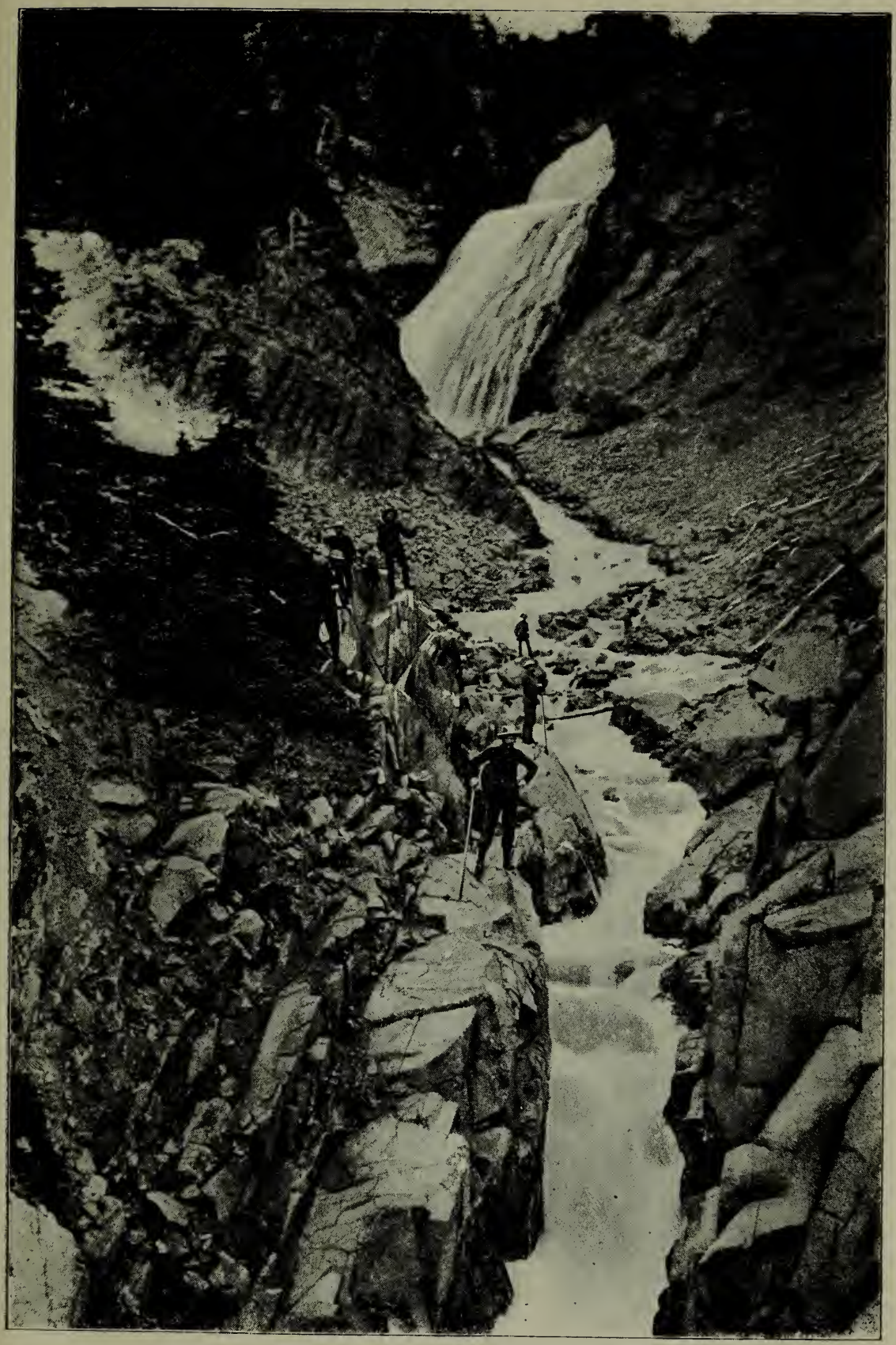
Photographic Club, Sutton Scientific and Literary Society.—Sutton, Surrey. Secretary, Mrs. Emily Culverhouse, The Hundred Acres, Sutton, Surrey. Place of meeting, the Scientific Society's rooms. Ordinary meetings, first Tuesday in each month. Annual meeting, in May.

Photographic Convention of the United Kingdom, The—Place of meeting for 1892, Edinburgh ; 1893, Plymouth.

Photographic Society of Great Britain, The—50 Great Russell Street, London, W.C. Secretary, Chapman Jones, F.I.C., F.C.S, 11 Eaton Rise, Ealing, W., and Assistant Secretary, 50 Great Russell Street, Bloomsbury, W.C. Place of meeting, 50 Great Russell Street, Bloomsbury, W.C. Ordinary meetings, second Tuesday in each month, at 8 o'clock P.M. Technical meetings, fourth Tuesday in the month, at 8 P.M. Annual meeting, second Tuesday in February, at 8 P.M.

Photographic Society of India.—Hon. Secretary, T. A. Pope. Place of meeting, 57 Park Street, Calcutta. Special meetings, as may be called.

Photographic Society of Ireland.—15 Dawson Street, Dublin, Ireland. Secretary, J. H. Hargrave, B.A., A.M.I.C.E., 3 Newtownsmith, Kingstown, Co. Dublin. Place of meeting, 15 Dawson Street,



John L. Taite, Photo.

W. Kurtz, Engr.

PARADISE FALLS.

Dublin. Ordinary meetings, second Friday and 4th Thursday in each month from October to May, both inclusive. Special meetings, smoking evenings and exhibitions during the winter and excursions in summer. Annual meeting, second Friday in February.

Putney Photographic Society.—Putney, London, S.W. Secretaries (joint Hon.), Mr. W. F. Gorin, 3 Montserrat Road, Putney, S. W.; Mr. L. S. Zachariasen, Alfred Villa, Putney Bridge Road, London, S.W. Place of meeting, High Street, Putney. Ordinary meetings, every Monday fortnight in winter, 8.30 P.M., first Monday, monthly, in summer. Special meetings, when necessary. Annual meeting, in May.

Richmond Camera Club.—Richmond, Surrey. Secretary and Treasurer, P. Ennis, 28 Halford Road, Richmond, Surrey. Place of meeting, Greyhound Hotel, George Street, Richmond. Ordinary meeting, every Friday, at 8 P.M. Annual meeting, held in October.

Royal College of Science, Photographic Society, R.C.S. South Kensington, London. Secretary, J. E. Snelus, Royal College of Science, South Kensington, London. Place of meeting, Royal College of Science, South Kensington. Ordinary meetings, Tuesdays, fortnightly. Annual meeting, end of October.

St. Bartholomew's Hospital Photographic Society.—St. Bartholomew's Hospital, West Smithfield, London, E.C. Place of meeting, St. Bartholomew's Hospital. Secretaries, D. J. Armitage, R. J. Hillier, St. Bartholomew's Hospital.

Sheffield Camera Club. Sheffield, Yorkshire, England. Secretary, Wm. Gilley, Jr., 11 Kenwood Park Road, Sheffield. Place of meeting. New Surrey Street. Ordinary meetings, fourth Wednesday in each month, at 7.30 P.M. Annual meeting, January.

Shropshire Camera Club.—Secretary, Walter W. Naunton, 9 The Square, Shrewsbury. Place of meeting, 9 The Square, Shrewsbury. Ordinary meetings, second Wednesday in each month.

Society for the Encouragement of Art Manufacture and Commerce.—Place of meeting, Society's house, Adelphi, London, W.C. Secretary, Sir Henry Trueman Wood, M.A.

South London Photographic Society.—Hanover Hall, Hanover Park, Peckham, S.E. Secretary, Chas. H. Oakden, 51 Melbourne Grove, East Dulwich, S.E. Place of meeting, Hanover Hall, Hanover Park, Peckham, S.E. Meetings, first and third Mondays in the month, at 8 P.M. Annual meeting, first Monday in April.

Southsea Amateur Photographic Society. — 3 King's Road. Secretary, Major H. V. B. Bruns, Ordnance Lodge, Portsmouth. Place of meeting, 3 King's Road, Southsea. Ordinary meeting, first Wednesday in each month, at 9 P.M., business of the Society. Special meetings, third Wednesday in every month, at 9 P.M. (informal meetings.) Annual meeting, second Wednesday in January.

Staffordshire Potteries Amateur Photographic Society.—Burslem. Ordinary meetings, first Tuesday in month, at 8 P.M. Place of meeting, Town Hall, Burslem. Secretaries, J. F. Hewitt, 35 Market Place; F. C. Powell, Swan Square, Burslem.

Stockton Photographic Society. — Stockton. Secretary, J. E. Ellam, Yarm. Place of meeting, Society's own rooms, Mason's Court. Ordinary meetings, second Tuesday in each month, at 8 P.M. Annual meeting, January.

Sun & Co.—A Postal Photographic Society. Established 1887. Application for membership to be addressed to Hon. Secretary, Martin E. Harding, Lexdon Gardens, Shrewsbury.

Swansea Amateur Photographic Association.—Swansea. Secretary, E. Ernest Morgan, Bryn Nant, Swansea. Place of meeting, Tenby Hotel. Ordinary meetings, last Friday in each month, at 7.30 P.M. Annual meeting, last Friday in October.

Sydenham Camera Club.—Headquarters, Greyhound Hotel, Sydenham. Hon. Treasurer and Secretary, H. H. Gray, 9 Thicket Road, Anerley, S.E., England. Place of meeting, Greyhound Hotel, Sydenham. Ordinary meetings, alternate Tuesdays. Special meetings, Outings every third Saturday, from May to September. Annual meeting, last Tuesday in December.

Sunbridge-Wells Amateur Photographic Association.—Hon. Secretary, Joseph Chamberlain, 14 Calverley Park Gardens, Tunbridge Wells. Place of meeting, Mechanics' Institute. Ordinary meetings, first Thursday in each month, at 8 o'clock in the evening. Special meetings, excursions during the summer. Annual meeting, in January.

Uttoxeter Photographic Society.—Uttoxeter, Staffordshire, Ordinary meetings, first Wednesday in the month, at 5.30 P.M. Place of meeting, Carber Street, Uttoxeter. Secretary, Alfred Parker, High Street, Uttoxeter.

Wallasey Photographic Association.—Egremont, Cheshire, England. Ordinary meetings, first Wednesday in each month. Place of meeting, Egremont Institute. Secretary, George G. Breading, 72 Church Street, Egremont, Cheshire.

Warrington Amateur Photographic Society.—Warrington, Eng. Secretary, Frederick Pearson, Springfield, Stockton Heath, Warrington. Place of meeting, The Museum, Warrington. Ordinary meetings, last Tuesday in each month. Annual meeting, last Tuesday in January.

West Kent Amateur Photographic Society.—Sideup, Kent. Secretary, Edward Hawkins, Manor Estate, Sideup, Kent. Place of meeting, Bexley and Sideup. Ordinary meetings, fortnightly.

West London Photographic Society.—West London. Hon. Secretary, Lionel C. Bennett, 30 Blandford Road, Bedford Park, Cheswick, London, W. Place of meeting, Cheswick School of Arts, Bedford Park, Cheswick. Ordinary meetings, second and fourth Fridays in the month during the session, 8 P.M. Special meetings, fortnightly smoking social evenings, at 8 P.M. Summer fortnightly excursions. Annual meeting, second Friday in October.

West Surrey Photographic Society.—Clapham Junction, London, S.W. Secretary, F. H. Smith, 107 Falcon Road, London, S.W. Place of meeting, the Central Public Library, Battersea. Ordinary meetings, first and third Wednesdays in each month, at 8 P.M. Annual meeting, third Wednesday in January.

Wolverhampton Photographic Society.—Secretaries, J. W. Evans and J. Gale, 52 Darlington Street, Wolverhampton. Place of meeting, Blind Institute, Victoria Street. Ordinary meetings, first Tuesday in each month.

Yorkshire College Photographic Club, The—Ordinary meetings, last Thursday in each month during college session. Place of meeting, the Yorkshire College. Secretary, Henry B. Hall.

Yorkshire Philosophical Society, Photographic Section.—York. Secretary, Henry R. Moiser, F.G.S., Heworth Grange, York, England. Place of meeting, the Museum, York. Ordinary meetings, the first Wednesday in every month, at 8 P.M. Special meetings as required. Annual meeting, first Wednesday in October.

Germany.

Berlin Freie Photographische Vereinigung.—President, Prof. Dr. G. Fritsch; Secretary, Franz Goerke, Maassen street, 32 W.

Berlin Deutsche Gesellschaft von Freunden der Photographie.—President, Prof. Dr. H. W. Vogel; Secretary, Dr. Schultz-Hencke, Königgraetz street, 90.

Berlin Photographischer Verein.—President, Dr. F. Stolze, Kirschen Allee, 21, Charlottenburg, Berlin.

Berlin Verein zur Förderung der Photographie.—President, Prof. Dr. H. W. Vogel; Secretary, L. Christmann, Brunnen str., 28 N.

Berlin Verein Photographischer Mitarbeiter.—President, A. Arke; Secretary, Otto Kietzer, Wrangle str., 5 II., S. O.

Berlin Zusammenkunft Practischer Photographen.—Dr. Adolf Miethe, Friedrichstr., 236.

Braunschweig Verein von Freunden der Photographie.—Prof. Dr. Max Mueller.

Deutscher Photographen Verein.—President, Karl Schwier; Weimar.

Dresden Photographen Gehilfen Verein.—President, P. Krause, Restaurant Fuchsbau, Kreutzstrasse, 2.

Frankfurt a / M. Amateur Photographen Verein.—President. V. B. Mulot.

Frankfurt a / M. Verein zur Pflege der Photographie und Verwandten Künste.—President, H. G. Hartmann; Secretary, F. W. Geldmacher.

Hamburg Amateur Photographen Verein.—President, Dr. A. Berndsen, Hamburg, Hohenfelde, Neu strasse, 48a.

Hamburg Verein Photographischer Mitarbeiter.—President, W. Poppe, sen., Holstentowr Rest., P. Löde.

Hamburg-Altona Photographische Gesellschaft.—President, A. Kleiner; Secretary, Herman Köster, Hamburg, Stein str., 58.

Hanover Photographischer Verein.—President, Major v. Hammerstein, Herrmann strasse, 38.

Kiel Photographische Gesellschaft.—President, Prof. L. Weber, Küter str., 8.

Leipzig Verein der Photographen Gehilfen.—President, Gustav Keller, addr., Magdeburg Bierhalle.

Magdeburg Photographen Verein.—President, W. Bergius, Regierung str., 20.

Magdeburg Verein der Photographen Gehilfen.—President, E. v. Flottwell, p. addr., Rud. Welter, Knochenhauer ufer strasse, 27–28 II.

München Photographischer Club.—President, C. Mebelacker, Schwanthaler strasse, 34.

München Photographische Gesellschaft.—President, Otto Wernhard, Sonnenstrasse, 24.

Rheinisch Westfälischer Verein zur Pflege, der Photographie Cöln., a / R.—President, Th. Creifelds, Cöln., a / R.

Photographische Genossenschaft von Essen und benachbarten Städten.—President, H. Witcamp, Hügel strasse, 49, Essen, a / R.

Schlesische Gesellschaft von Freunden der Photographie.—President, Prof. Dr. A. Neisser, Museum strasse, 11 Breslau.

Schleswig-Holsteiner Photographen Verein.—President, G. J. Koch; Secretary, Wilhelm Dressen, Fleusberg.

Austria.

Lemberg Klub miłośników sztuki fotograficznej sve Lwowie.—President, Dr. Carl Stromenger, Lemberg, Gallicia.

Vienna Club der Amateur Photographen.—President, Carl Srna; Secretary, Carl Winkelbauer, 4 Wallfischgasse, Vienna I.

Vienna Photographische Gesellschaft.—President, Lt.-Col. O. Volkmer; Secretary, Prof. Fritz Luckhart, Carmelitergasse, 7, Vienna II.

Vienna Verein Photographischer Mitarbeiter.—President, W. Weiss; Secretary, Rudolph Perlmann, Barmherzigeng, Vienna III.

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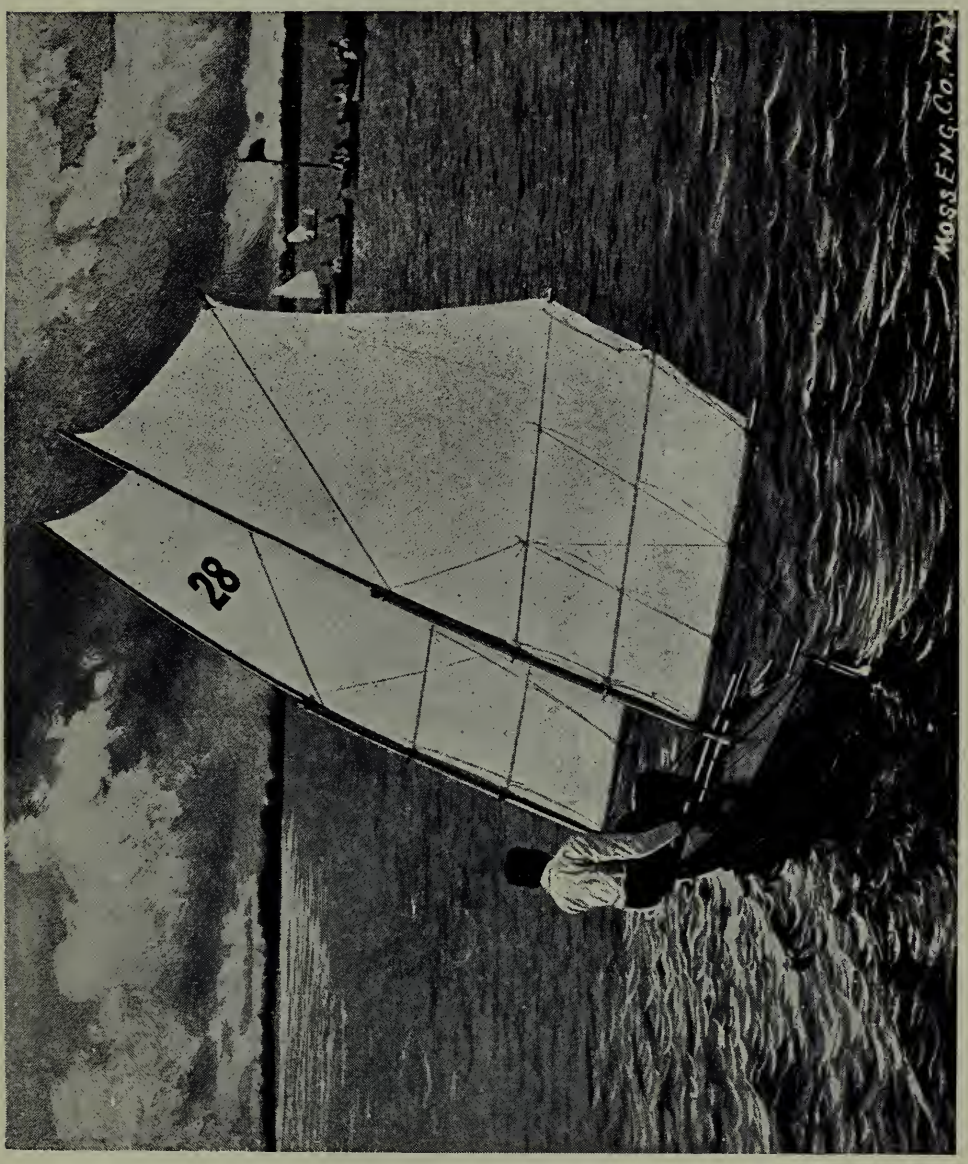


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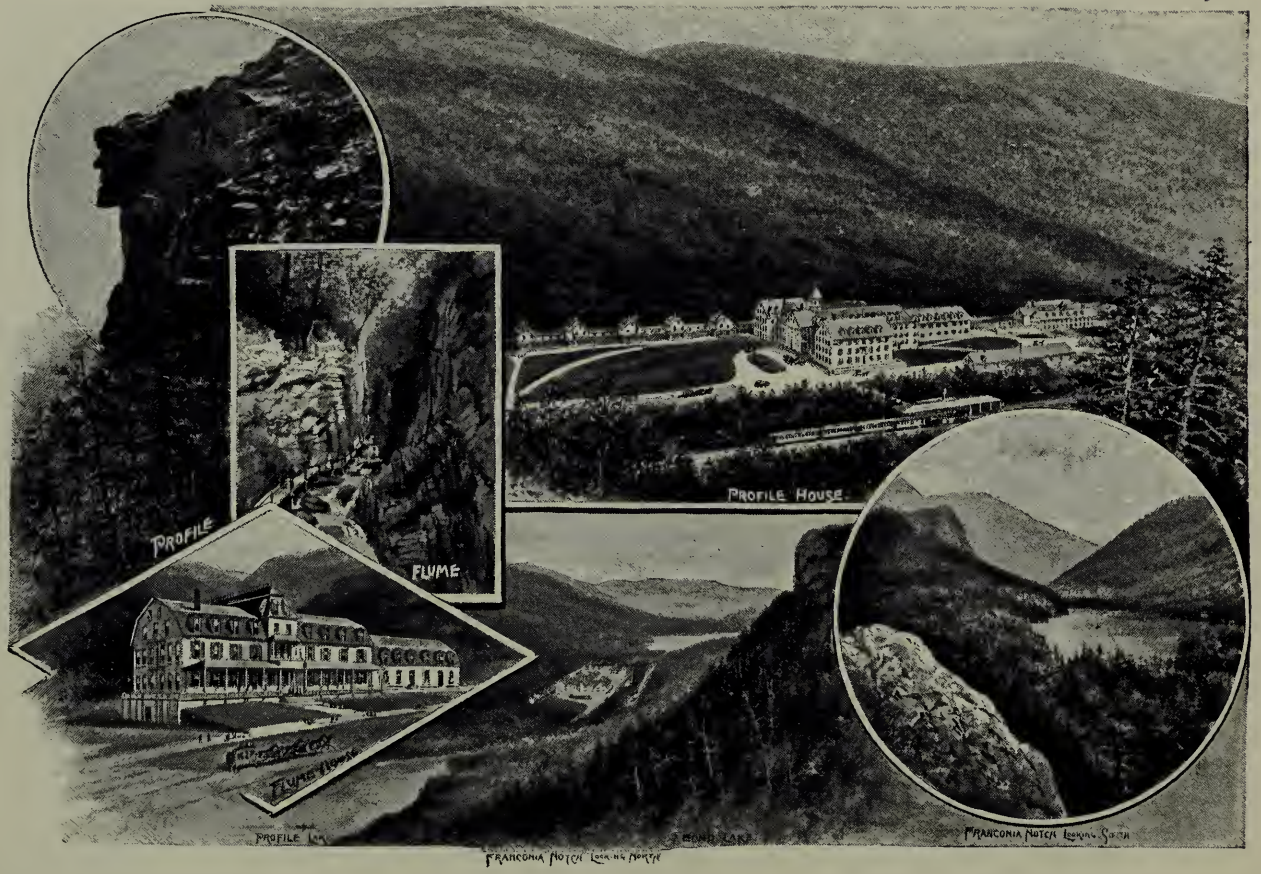


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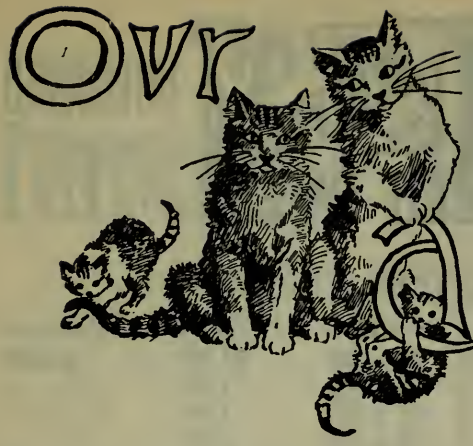
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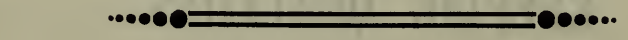


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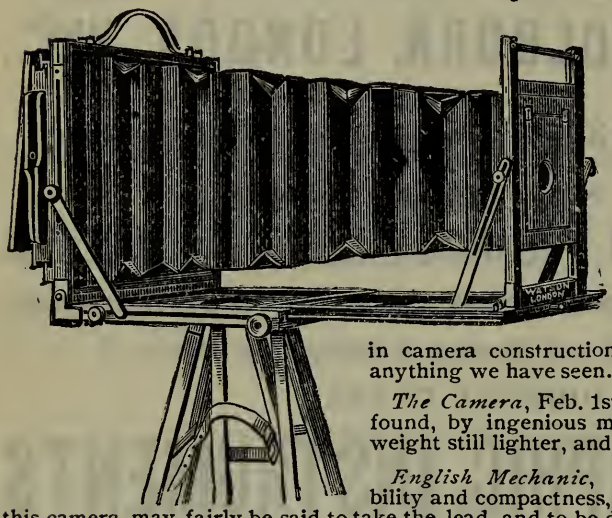
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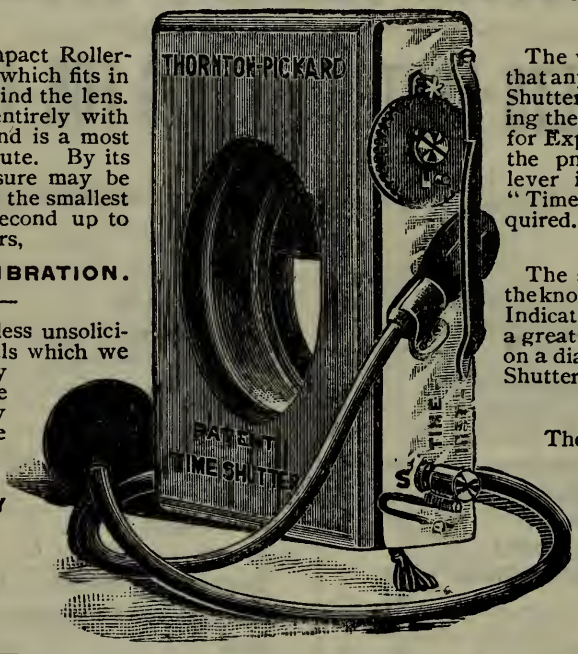
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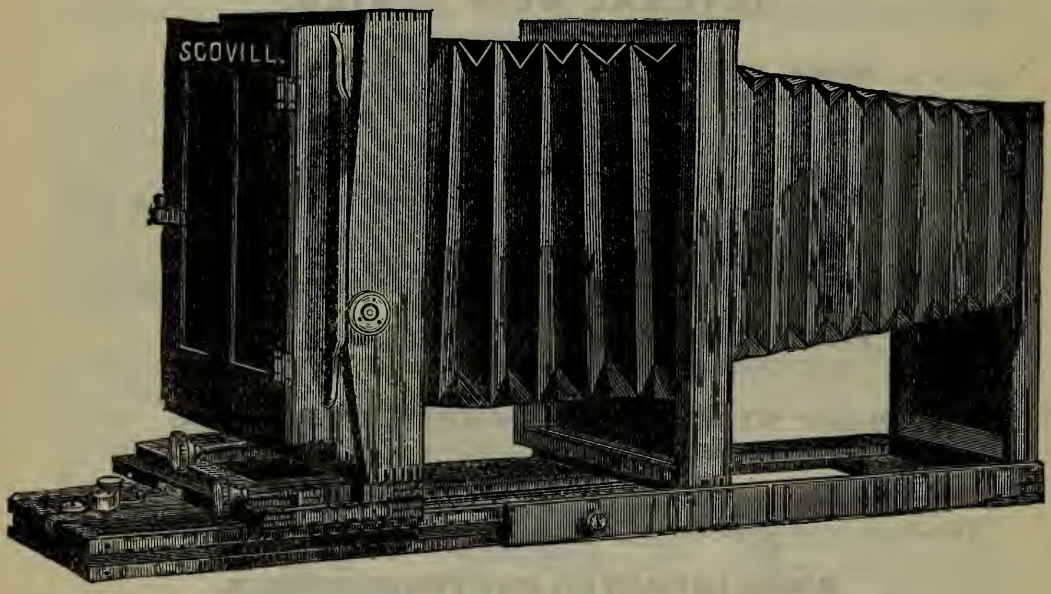
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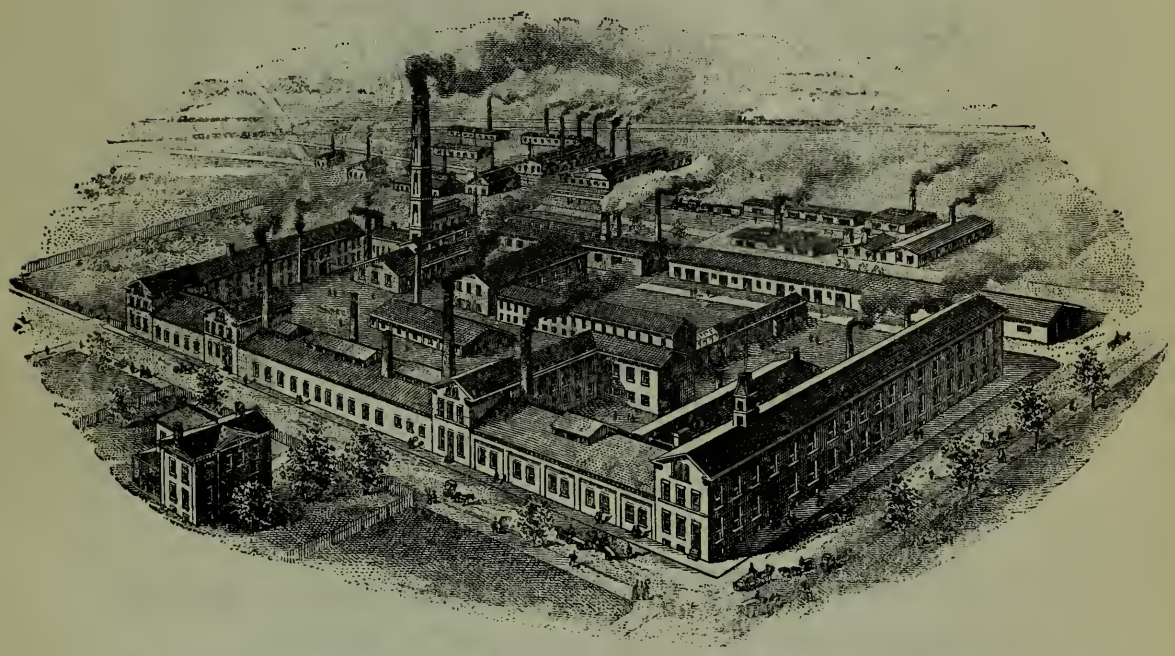
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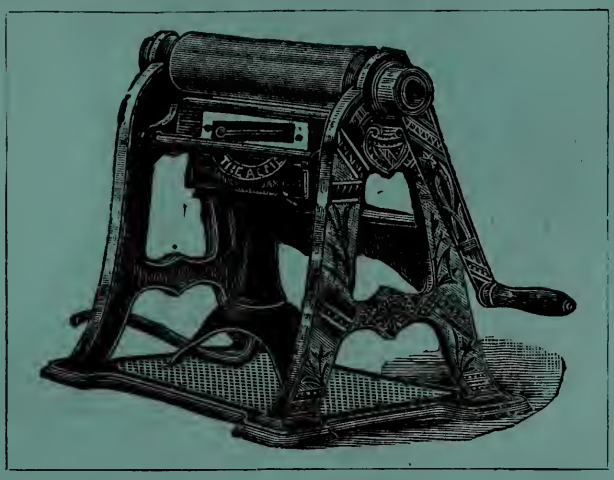
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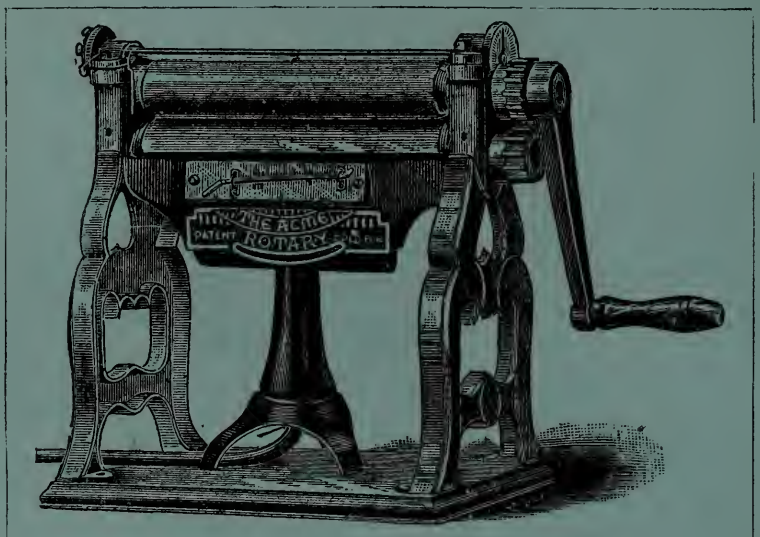
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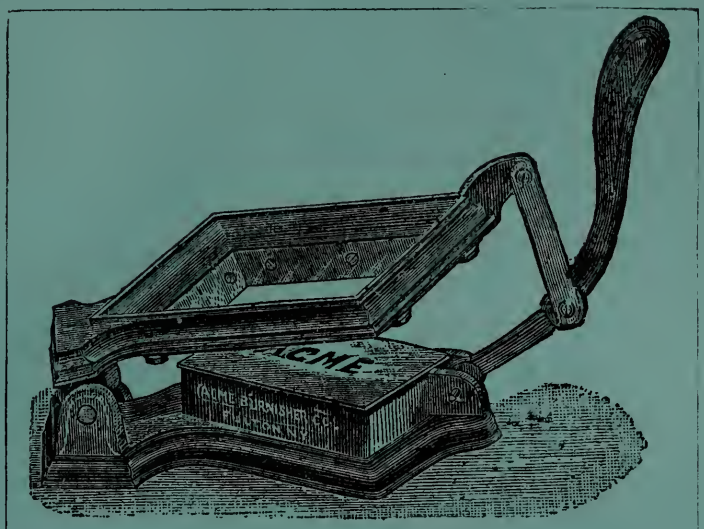
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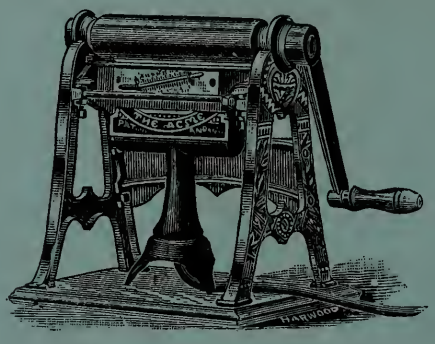
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Potassium carbonate	1½	ounces
Water	32	ounces

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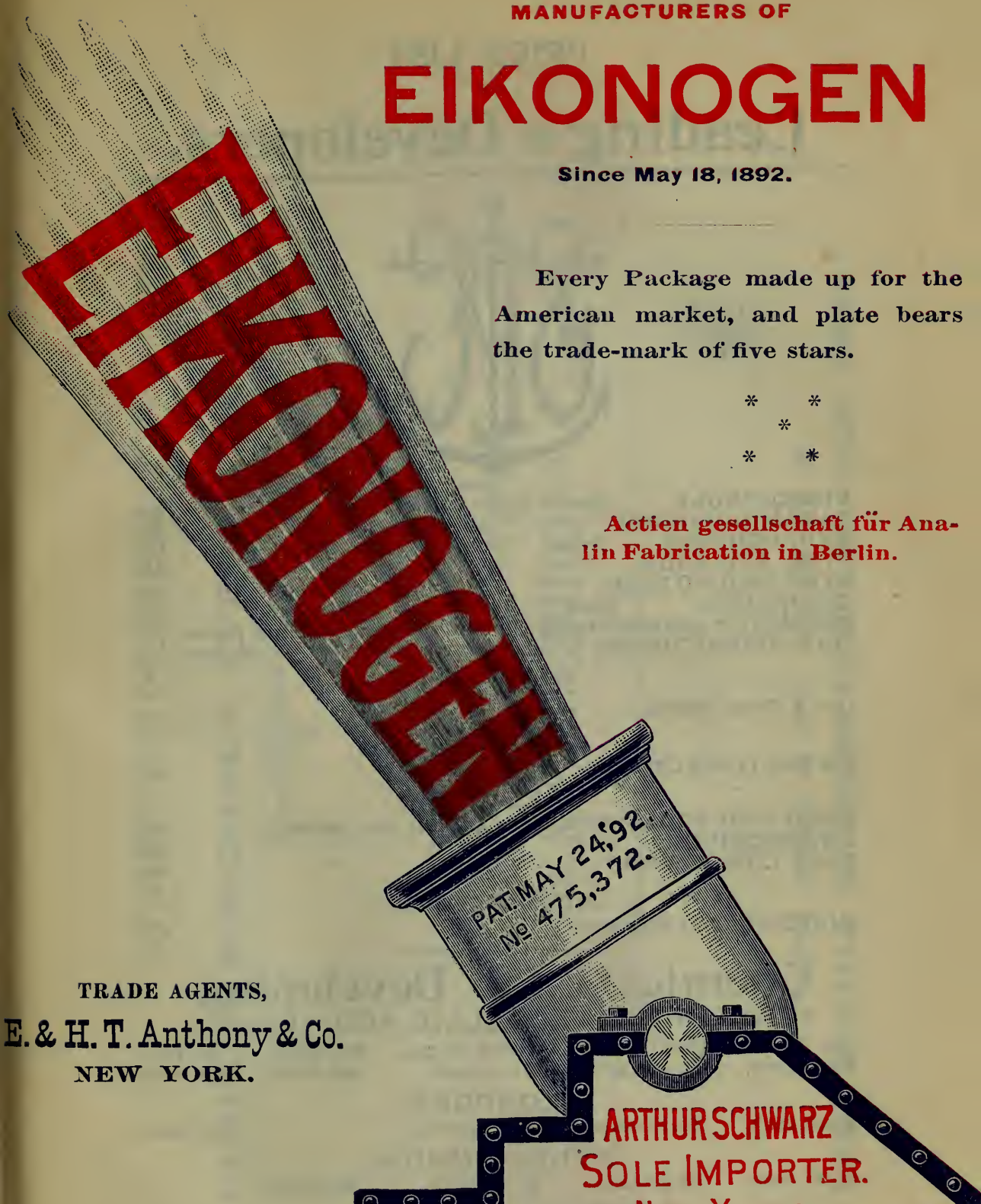
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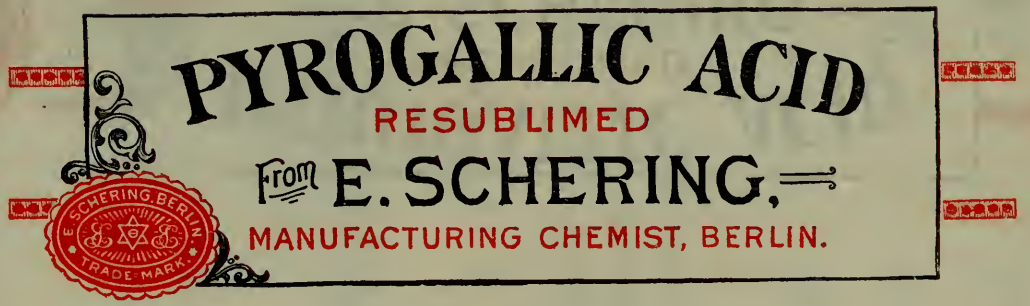
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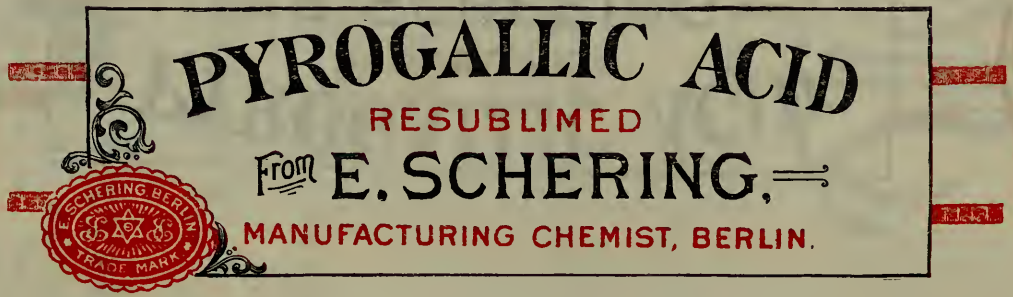
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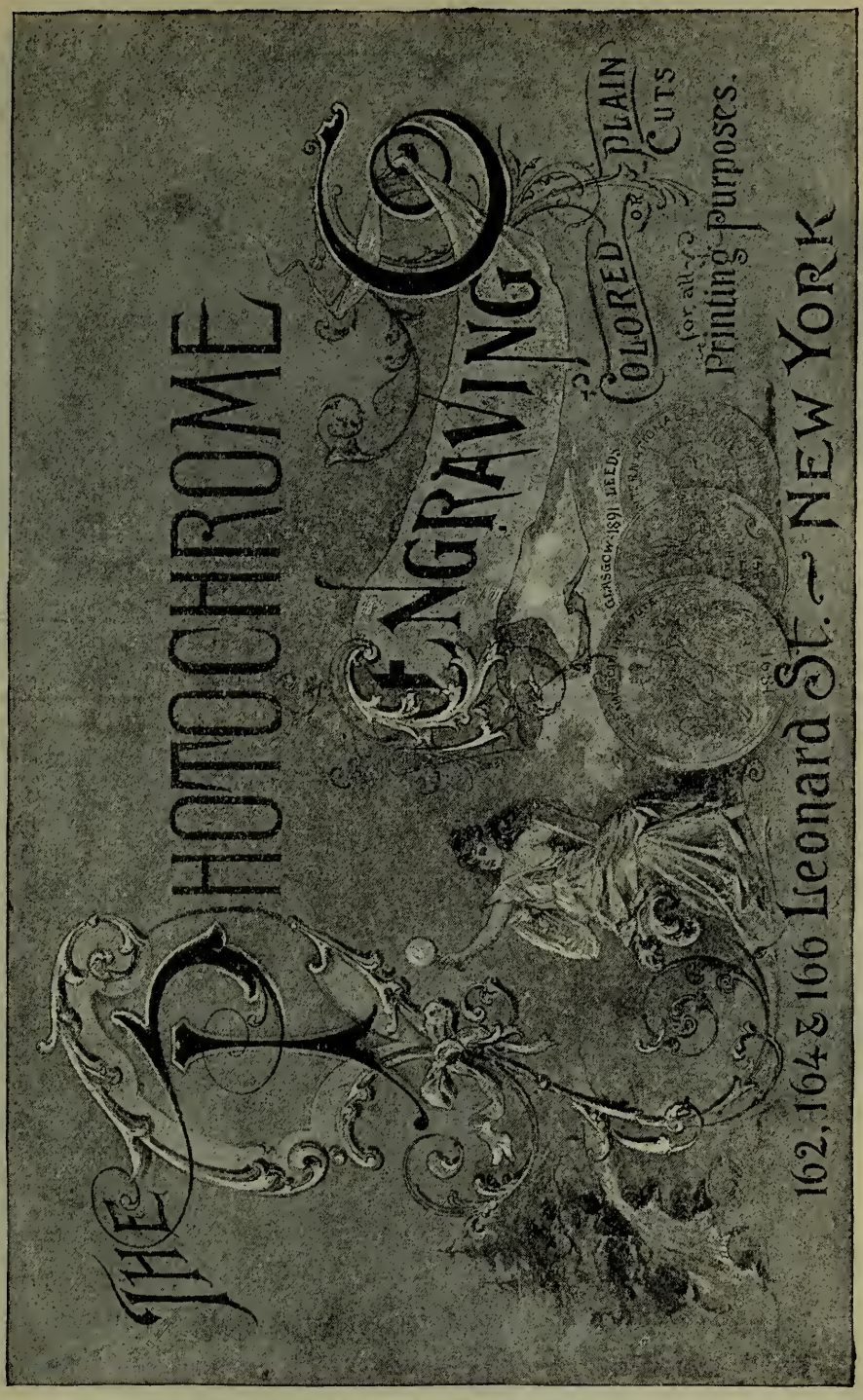
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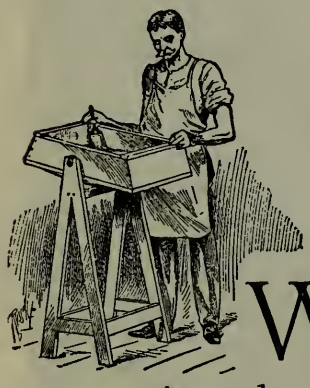
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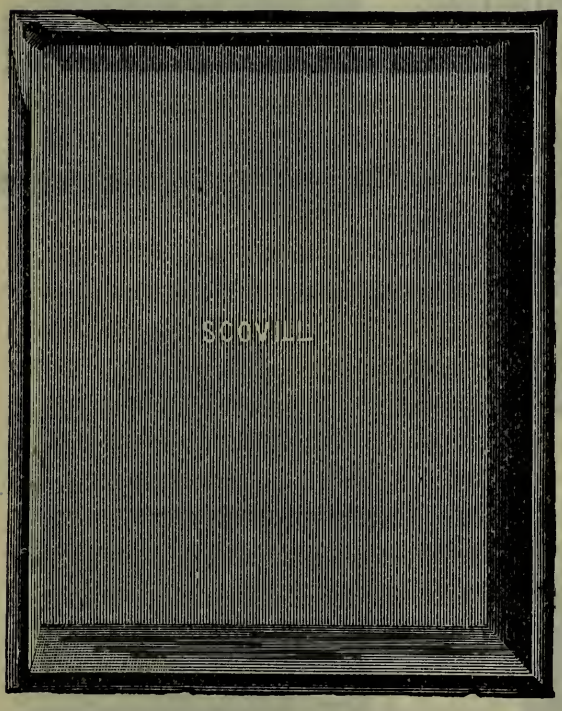
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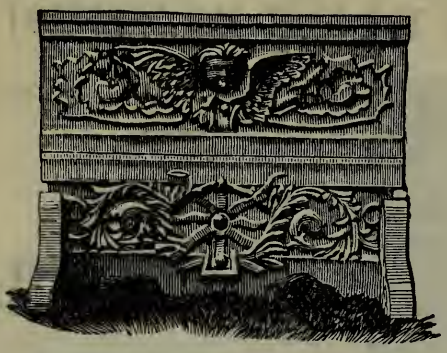
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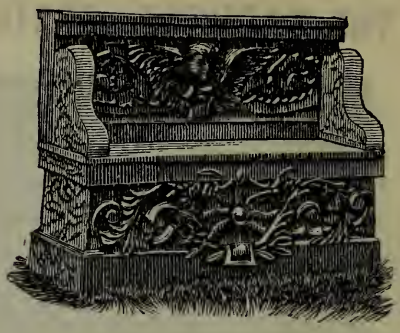
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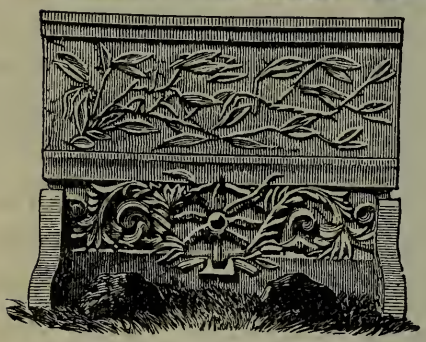
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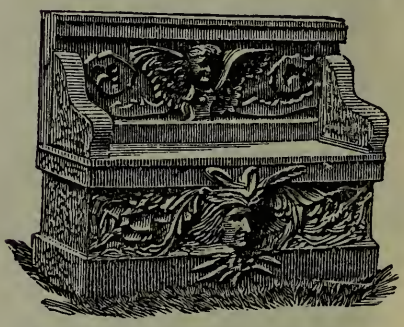
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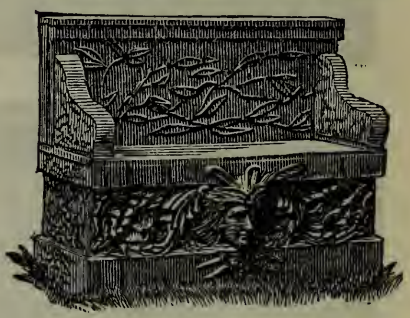


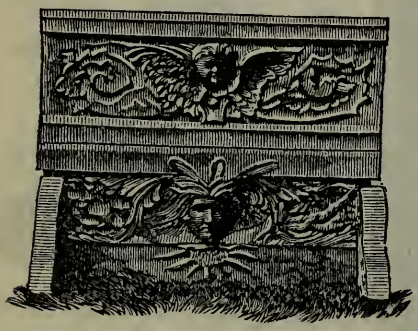
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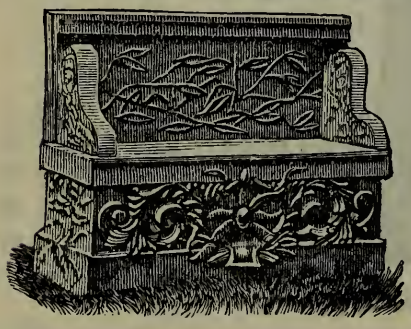
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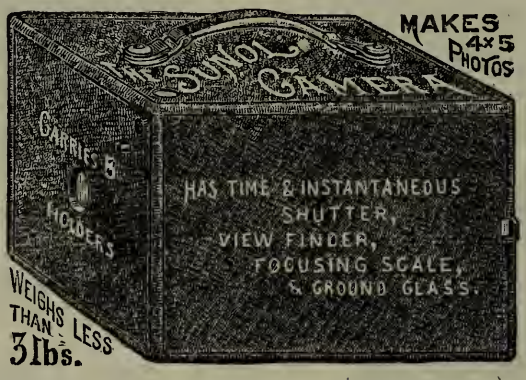
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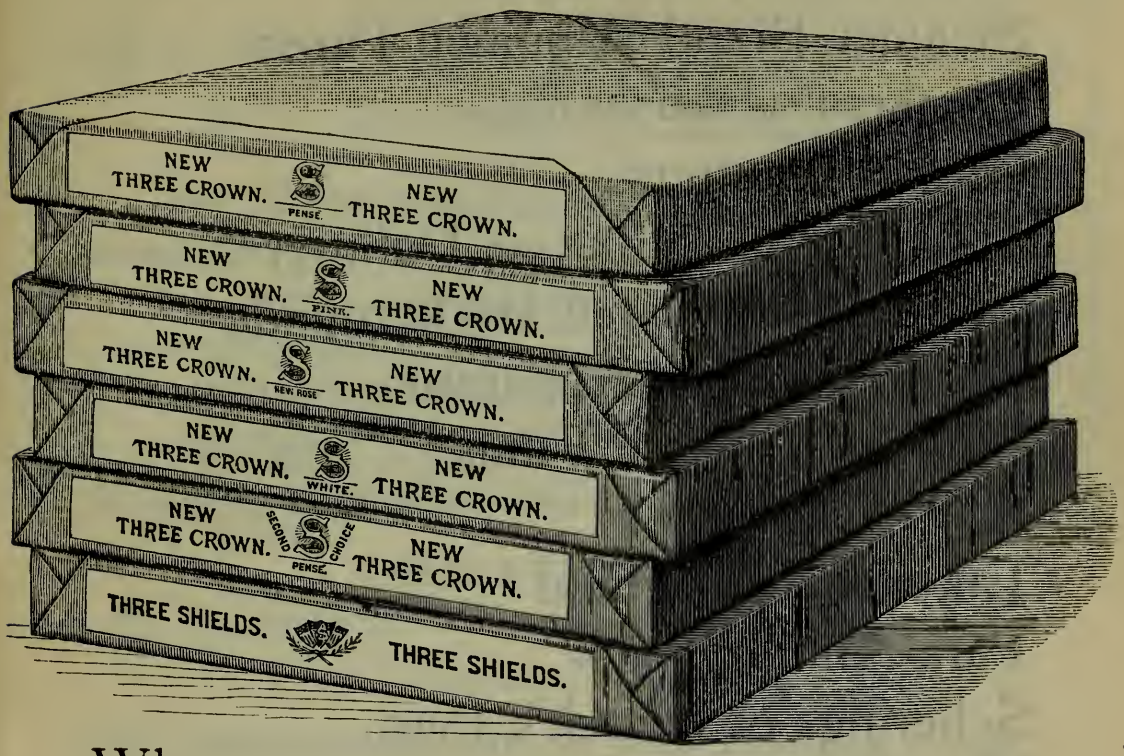
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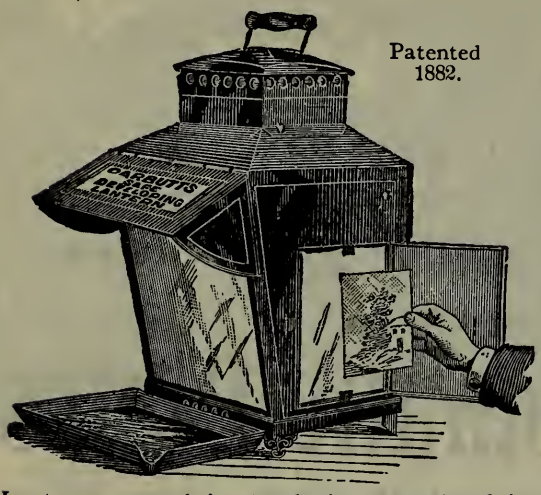
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Lantern arranged for developing, and after fixing examining negatives by opal light.

HAS three separate and distinct forms of light, each side and front. The left side door when open emits a clear white light for making Transparencies by contact. The front a safe 8 x 10 Ruby light for developing by. The right door when open a soft Opal light for examining Negatives or Transparencies.

It is fitted with coal oil lamp, silvered reflector, and movable hood on front to shade the eyes.

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Can be modified and controlled with the same ease as the old pyro developer, which it is destined to supersede.

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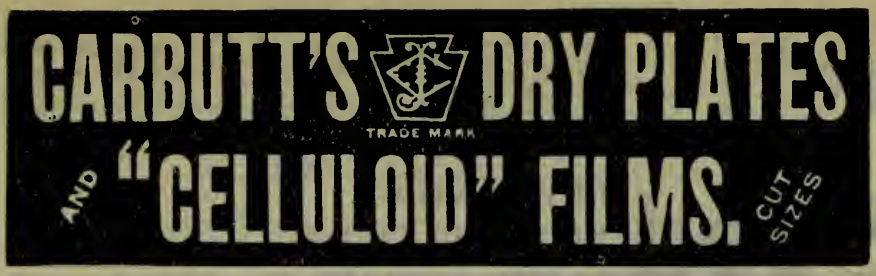
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By means of this new Developer the most perfect Transparencies can be obtained on suitable Dry Plates with the greatest facility. It is the only Developer yet discovered which will produce (on Rapid Gelatine Plates) Lantern Slides of the highest class with RICH WARM TONES and perfectly clear glass in the highest lights.

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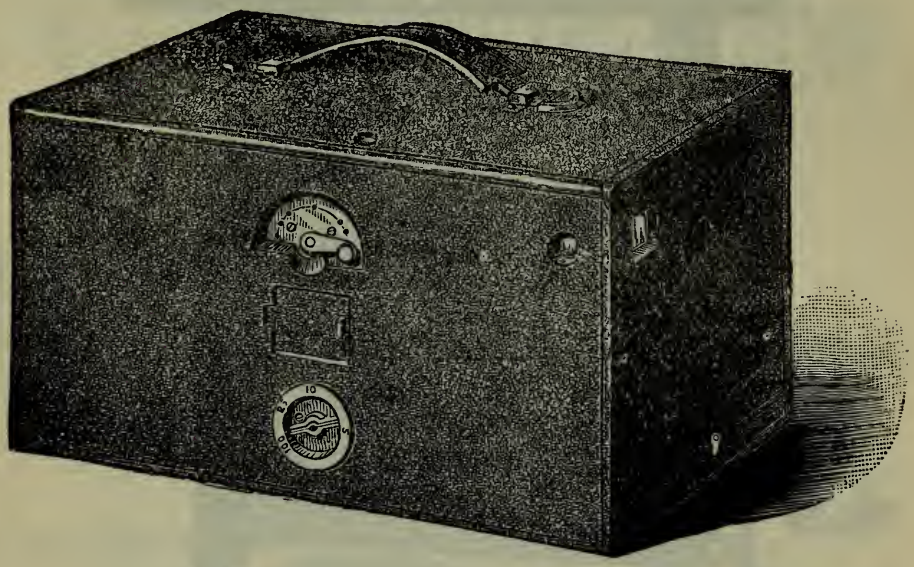
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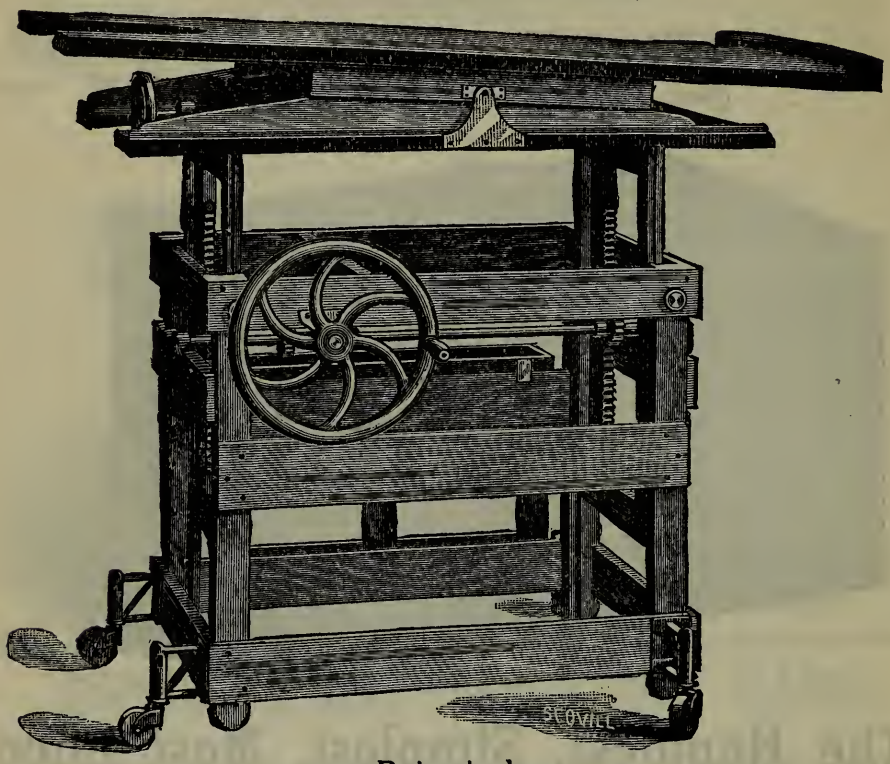
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"ELITE" STUDIO STANDS

	No. 1 Size.	No. 2 Size
PRICE, with Rack and extension for Plate Holder	$32.00	$36.00
Highest point from platform to floor	48	48
Lowest " " " "	32	32
Width of platform	22	26
Length of platform without attachment	45	52
" " with "	60	70

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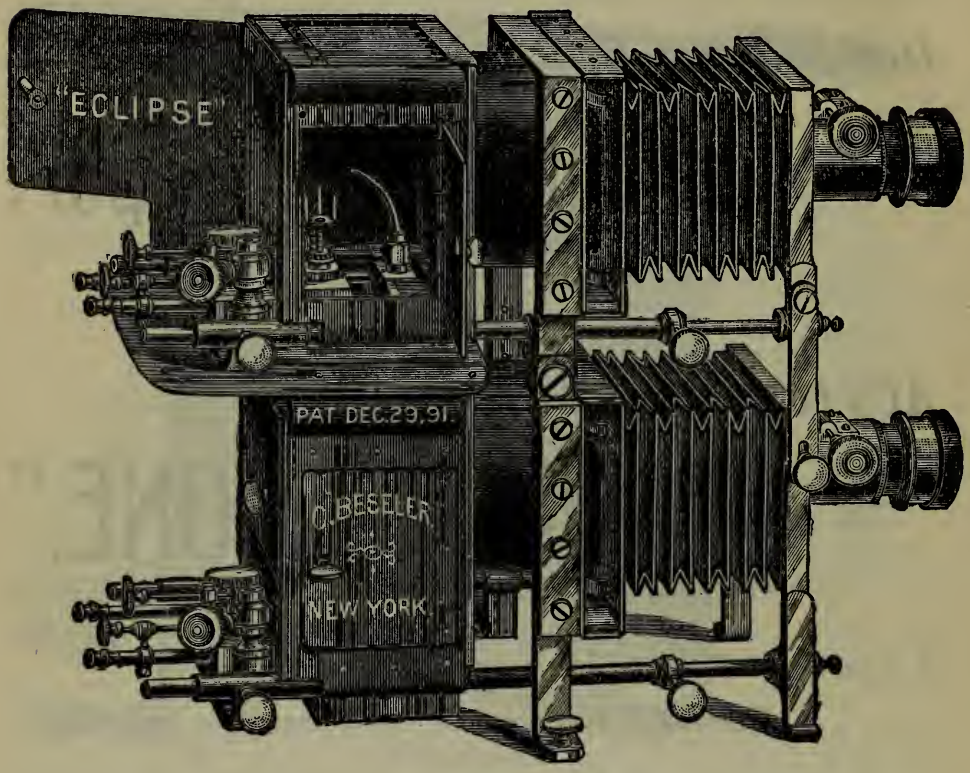
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After experimenting with most of the lanterns in the market, we have come to the conclusion that for parlor or small hall exhibitions, chemical and optical experiments, etc., the ACME LANTERN affords, at a moderate price, the greatest number of advantages, and from its simplicity and non-liability to get out of order, gives, even in inexperienced hands, results superior to all others.

The ACME SCIOPTICON when packed for carrying, in its own Russia iron case, measures 15 x 10 x 6 inches, and weighs 12 pounds: the case serving as a convenient stand when the lantern is in use.

The CASE and BODY of the Lantern are of Russia iron, and neat and compact in form. That part of the body which surrounds the lamp is double, the outer cover being ornamentally perforated so as to allow a constant current of air to circulate and keep down the temperature.

The lamp is of the triple wick variety, and so constructed that the three flames combine and by the draught of a ten-inch chimney give a brilliant flame.

The CONDENSER is four inches in diameter, neatly mounted in brass, thoroughly ventilated, and arranged with screw flange so that the lenses may be separated and cleaned when required.

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Symmetrical Lens with which I am
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Unless I am mistaken it is
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Yours Truly
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A full set of 6 stops, numbered according to method adopted by the Photo Society of Great Britain accompany each Lens.

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THIS LENS requires much less "stopping down," than other instruments, that is to say: a much larger stop can be used for same size figure, diameter of Lens, &c., considered. This is an important advantage which has already been alluded to by several of our patrons.

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Dear Sirs—I have yet to find a good Flash Lamp, and if you have one which in quality approaches your Shutters, I can sell a number of them. Let me know what the Lamp will actually do; and does it go when you don't want it to. * * * * * * *

It is remarkable how much your Shutters stand. * * * I think I must have had mine four years, and probably averaged 1,000 to 1,500 negatives a year, and it is as good as ever; and withal, *it's a big satisfaction to be sure of your Shutter when you start on a trip.* Yours very truly, T. W. INGERSOLL.

[Used on mountain, in valley, in tropic heat and Alaska's cold.]

THE TOPLEY STUDIO,
OTTAWA (CANADA), Aug. 28th, 1891.

Gentlemen—I want Triplex Shutters for Lenses sent to-day. * * * I also send you two very fine flash-light photos. taken with your Lamp. It is the finest Lamp I ever saw. You will recognize the plants to be "night-blooming cereus." * * *

These photos. were taken at 11 P.M. I was fortunate to get a plant with twelve blooms open at once. I am very proud of my success, and can give you a valuable testimonial if you want it. I am yours, WM. J. TOPLEY.

[Beautiful 8 x 10 photos. Copies worth having.]

Our **Storage Flash Lamp** is small, but is a giant. It is but 4½ x 3 x 2½ inches in size. It gives a **vertical sheet** flame about 100 square inches surface. Repeated short flashes, or one continued for several seconds, can be given.

One long flash from one Lamp will sufficiently illuminate any ordinary lecture hall or large reception-room. No bulb being used, both hands may be free. Lung pressure will operate several Lamps. The Lamp can be held in the hand or attached to a stand rod.

It is convenient and safe to use, and always certain to act.

Made of brass, nickel-plated. Price complete, $5.00.

Will do more, and better, than any $5.00 worth of other Lamps.

Our **"Triplex" Shutters** combine movements for Time: **Slow Instantaneous**—by bulb pressure. **Quick Instantaneous**—small to medium sizes as quick as 250 of second. They are supplied for **Detective, Stereoscopic,** and **Regular View Cameras.**

Our **"Athlete" Shutter** has all the movements of the "Triplex," but has been produced with special reference to very rapid movement, for use on **Athletic** and **Race-track** work. It is a decided success. The "king" photographer of sporting events, John C. Hemment, uses it exclusively.

No Shutter of American or foreign production compares with it, either for general photographing or special rapid work.

Prosch Photographic Appliances always give satisfaction!

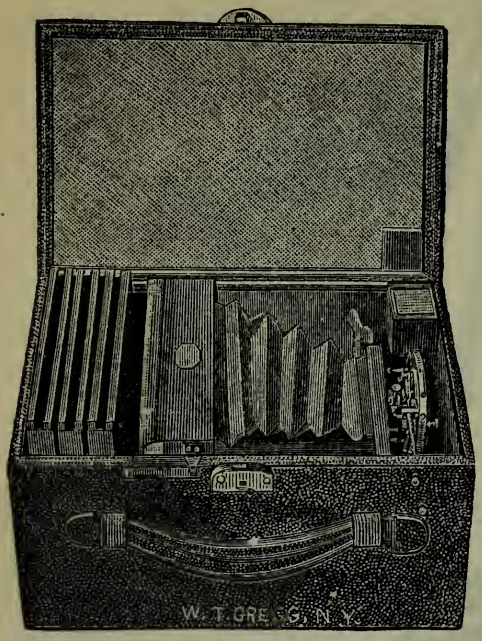
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PROSCH MANUFACTURING COMPANY,

389 Broome Street, NEW YORK.

The BEST is none too good, therefore buy

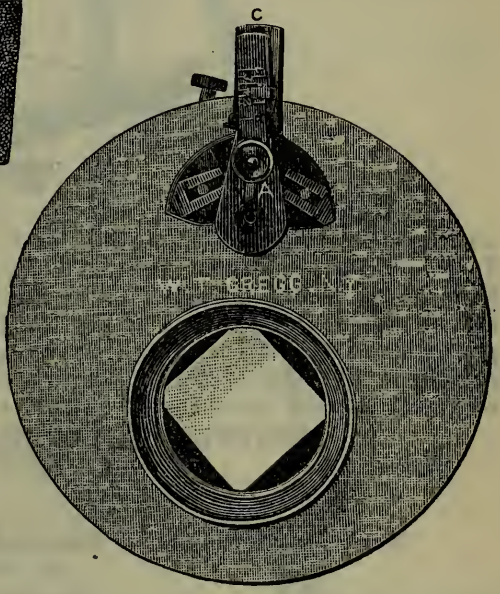
THE AMERICAN COMPACT CAMERA,



THE
Universal
Hand Camera,

THE
Wide-Angle-
Landscape Lens,

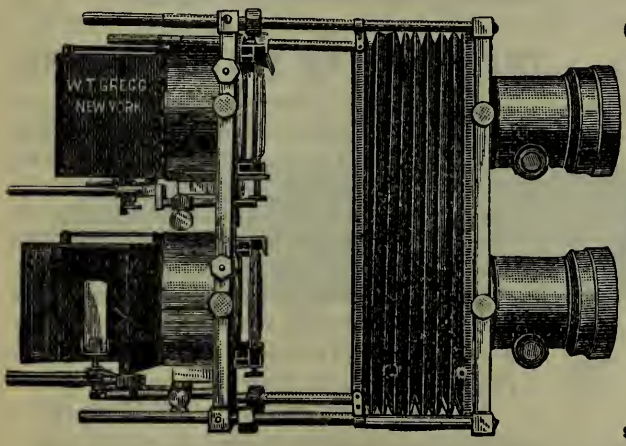
THE
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Biunial,
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OIL OR GAS

Lantern Views.



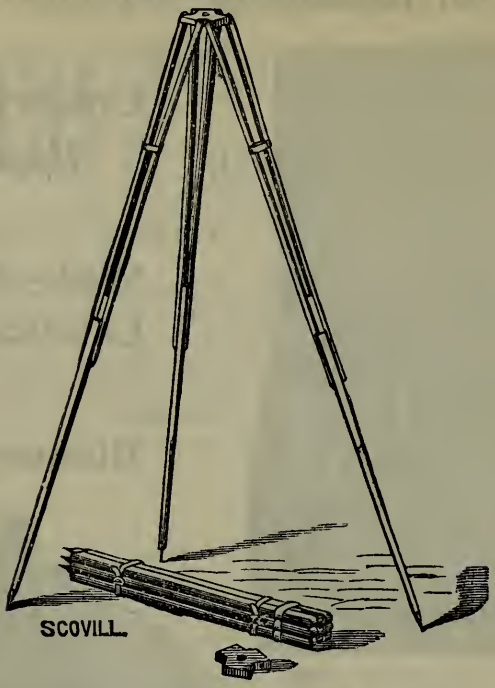
Cameras,
Shutters,
Lanterns
made to order by

WM. T. GREGG
Optician,
122 FULTON STREET,
NEW YORK.

SEND STAMP FOR CATALOGUE.

The Scovill Adjustable Tripod.

(FEATHER WEIGHT.)



Nothing more compact, certainly nothing as graceful in appearance and light in weight as the new Tripod for out-door Photography, just produced by the American Optical Company, has yet made its appearance. Because so readily adjusted to the utmost irregularity of the earth's surface, it was decided to call it the "Adjustable Tripod." Lady amateurs prefer it to any other pattern on account of its lightness and beauty. The top is covered with billiard-cloth to prevent marring the fine polish on our cameras, and the clamping screws are not detachable.

SCOVILL ADJUSTABLE TRIPOD.

No. 1..... Price, each, $3.50
" 2..... " " 5.00

Scovill Adjustable Jointed Tripod, to fold and pack in a 22-inch Valise..... $4.00
Do. with Canvas Bag and Handle.. 4.75



THE IMPROVED TAYLOR TRIPOD.

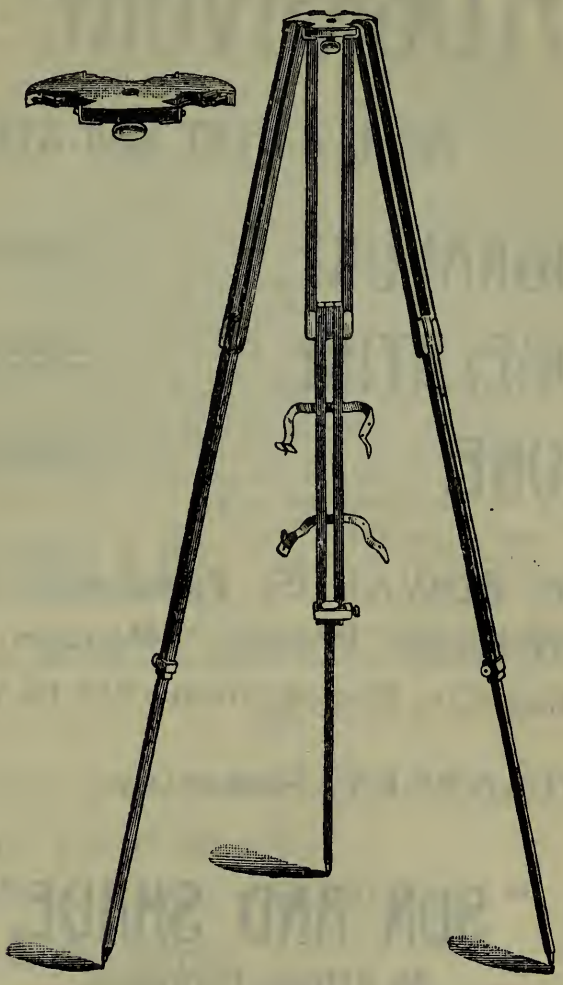
The illustration here presented makes an extended description unnecessary. Suffice it to say that this tripod is very firm when set up, and folds up compactly by simply pressing together the two upper joints of each leg, thus unsetting them from the pins on the brass top and then doubling them over on to the third joint. This movement is naturally reversed when placing the tripod in position to support the camera.

Price, with metal disc and non-detachable screw.....$2.25 each.

Adapted for cameras from 1-4 to 8x10 size.

THE ALBION TRIPOD.

This is the most elegant Tripod ever introduced. It is adapted to and is firm enough to support without vibration any View Camera from 5 x 7 to 10 x 12 size, inclusive.



The Legs of this Tripod are adjustable as to length, and may be quickly folded. As the binding straps are attached, they are always in place when wanted.

The artistic design and faultless finish of every portion of this Tripod cannot be realized without seeing one, and to use an ALBION TRIPOD means to be fully satisfied, and wish for none other.



No. 1, Cherry wood..... $4 50
No. 2, " " 6 00
No. 3, Spruce (very light), price..... 6 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

NEW YORK
PHOTOGRAVURE CO.

No. 137 WEST 23d STREET, N. Y.

PHOTOGRAVURE.
PHOTOGELATINE.
HALFTONE.

ERNEST EDWARDS, PRESIDENT, Inventor of the Heliotype Process. Manager, Heliotype Printing Co., Boston, from 1872 to 1886.

W. R. STANBERY, SECRETARY.

"SUN AND SHADE,"
An Artistic Periodical.

ART DIRECTOR, A. V. S. ANTHONY, for many years Art Director for Ticknor & Fields, and Fields, Osgood & Co.

"Plates of the highest merit both in design and execution."
—*The Independent*, New York

"The highest level of achievement in photogravure work."
—*The World*, New York

"Photogravures of the highest quality."—*The Hearld*, New York.

"Possessing the quality of drawing in India Ink or Sepia."
—*The Sun*, New York

What some of the Photographic Journals say of our Catalogue.

"Newcomb & Co., one of the most enterprising houses in goods for the amateur in New York, have issued a very instructive catalogue of the goods they have to sell. They are particularly well situated for business and supply a large amateur trade. Mr. Newcomb is a practical photographer, well versed in the many new processes, which make their store all the more attractive, since, besides making a purchase, one is certain to obtain useful and practical information."—*American Amateur Photographer.*

"E. W. Newcomb & Co., 69 West 36th Street, New York, send a beautifully got up and well illustrated catalogue and price list of photographic apparatus and material.

"In addition to a full assortment of what may be called the ordinary trade apparatus and appliances, which this catalogue contains in common with those of other houses, it includes much that they do not have, in specialties, formulæ and working instructions for some of the less familiar processes. We are especially pleased that special attention is given to pigment printing, and that tissue of at least four different colors is supplied in cut sizes, with all necessary material at very moderate prices. The same may be said of most of the other printing methods, including platinum, iron, silver, paper for the latter being kept, either what is known as 'ready sensitized,' or prepared fresh daily.

"Those who for want of time or inclination do not or cannot do more than 'press the button' will find in Newcomb & Co. a friend in need, who will develop, print, mount and in fact do everything else that they may require.

"We turn from a perusal of this interesting catalogue with a feeling that 69 West Thirty-sixth Street must be the amateur photographer's El Dorado, and should be the headquarters of all who live in or frequently visit New York."—*The Beacon*, March, 1892.

"The attention of our readers is called to the advertisement, in this issue, of E. W. Newcomb & Co., New York City. The firm issues one of the handsomest catalogues that has come to our desk, printed on superfine book paper, in which is published numerous valuable formulas which, in addition to the other valuable matter it contains, will make it eagerly sought by all who shall read this notice. A small sum is charged, ten cents, in order that such a valuable work may not be sent where it will not be appreciated."—*St. Louis and Canadian Photographer.*

Sent on receipt of Ten Cents.

E. W. NEWCOMB & CO.,

Photographic Apparatus and Supplies,

See Advt., Page 1.

No. 69 West 36th Street, New York City.

If

You want your orders filled promptly for

Collins' Card Stock,
Carbutt's Films and Plates,
Schering's Pyro,
Acme Burnishers,

BP **Aristotype Paper,**

Three Crown, Eagle, and N. P. A. Albumen Paper,

Send your order to

THE SCOVILL & ADAMS COMPANY.

Photographic Goods ✻



OF EVERY DESCRIPTION.

Photographic Professional Artists and Amateurs,

Before you purchase a Camera, send for a copy of our descriptive

Manuals

of new Cameras made by the American Optical Company and the Scovill New Haven Factories.

THE SCOVILL & ADAMS COMPANY,

423 BROOME STREET, N. Y.

HARD RUBBER PLATES.

FOR SQUEEGEEING PRINTS UPON.

			1/16 in. thick.				1/16 in. thick.
4	x	5	10 cents each.	8	x	10	40 cents each
5	x	7	18 "	10	x	12	60 "
5	x	8	20 "	11	x	14	75 "
6½	x	8½	30 "				

SQUEEGEES.

6	inches,	each	$0 40
8	"	"	50
12	"	"	75

—S. P. C.—

JAPANNED DEVELOPING TRAYS

(Made of Selected Metal)

—FOR—

DRY PLATE PHOTOGRAPHY.

Size	4½	x	5½	inches	price each,	20	cents.
"	5½	x	8½	"	"	25	"
"	7	x	9	"	"	30	"
"	8½	x	10½	"	"	40	"

IMPROVED PAPIER MACHE TRAYS,

THE COATING OF WHICH IS SUPERIOR TO ANY GOODS OF THIS CLASS YET PUT UPON THE MARKET.

PRICE LIST PAPIER MACHE TRAYS.

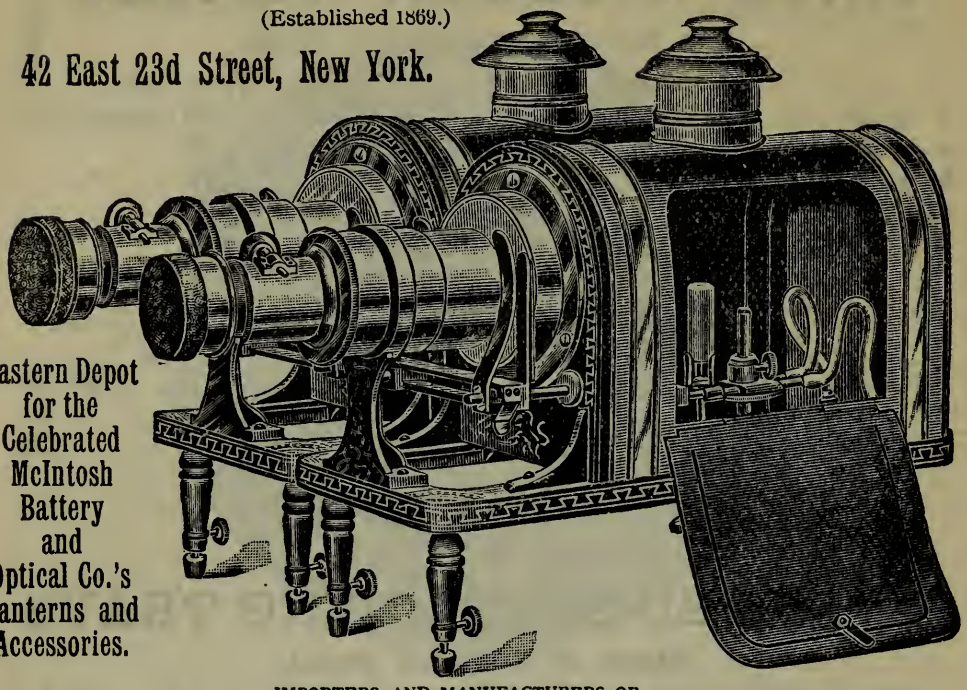
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"	3,	"	5	x	7	" "		50
"	4,	"	5	x	8	" "		50
"	5,	"	7	x	9	" "		75
"	6,	"	8	x	10	" "		1 00
"	7,	"	10	x	12	" "		1 50
"	8,	"	12	x	14	" "		2 00
"	9,	"	14	x	18	" "		2 75
"	10,	"	16	x	20	" "		3 25
"	11,	"	19	x	24	" "		5 50
"	12,	"	23	x	27	" "		6 50
"	13,	"	26	x	30	" "		7 50
"	14,	"	28	x	34	" "		8 50

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OELSCHLAEGER BROS.

(Established 1869.)

42 East 23d Street, New York.



Eastern Depot for the Celebrated McIntosh Battery and Optical Co.'s Lanterns and Accessories.

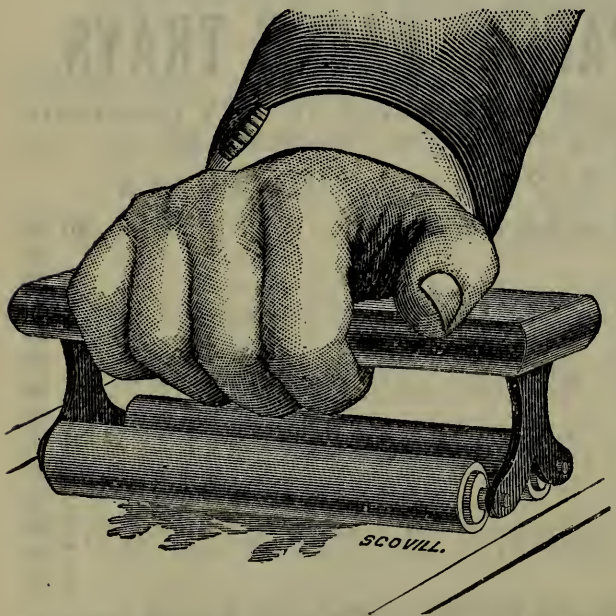
IMPORTERS AND MANUFACTURERS OF

STEREOPTICONS AND FINE MAGIC-LANTERNS, LANTERN-SLIDES AND ACCESSORIES.

PHOTOGRAPHIC LENSES, CONDENSING LENSES AND OBJECTIVES A SPECIALTY.

The Columbia Print Roller.

PRICE, $1.00.



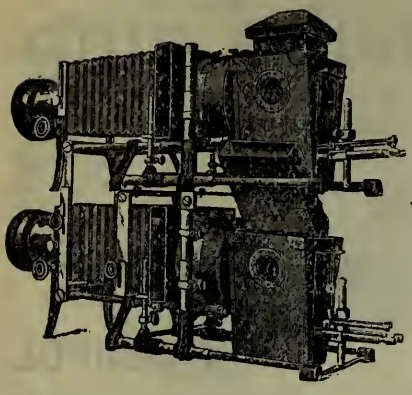
A good and handy Print Mounter. Its construction is such that more or less pressure can be brought to bear upon the print, to remove air cells and inequalities, and leave a smooth surface. The rollers are six inches long.

Try one and be convinced of its merits.

THE SCOVILL & ADAMS CO.

YOU WANT A GOOD

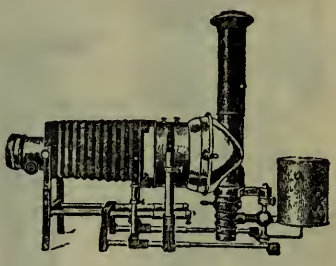
MAGIC LANTERN



AND

YOU KNOW

IT.



Why! how can you show all those views you took with your camera to half so good advantage any other way? Or how can you **entertain, instruct,** or **make money** evenings in half so delightful a manner as with a good Stereopticon and an interesting collection of Slides.

The Parabolon Oil-Light Lanterns are by far the best of any oil-light lanterns, and our **Oxy-Hydrogen Stereopticons** cannot be excelled. Catalogues free. Mention this periodical.

The "Criterion," illustrated above, is the latest, the most compact and most complete apparatus for all occasions.

J. B. COLT & CO., MANUFACTURERS, PHOTOGRAPHERS, COLORERS, 16 Beekman St., New York. 189 La Salle St., Chicago.

FELT BACKGROUNDS.

The Scovill & Adams' Plain Felt Background, recently introduced, is a great boon to all Photographers, both Professional and Amateur.

It is made of strong, thick and even stock, and is of an agreeable neutral drab color. It is especially suitable for vignetting. The texture of the cloth absorbs instead of reflecting light, and thus produces soft effects, and agreeable depth in print. The liability of defacement by water stains is obviated.

The prices of these grounds are as follows:

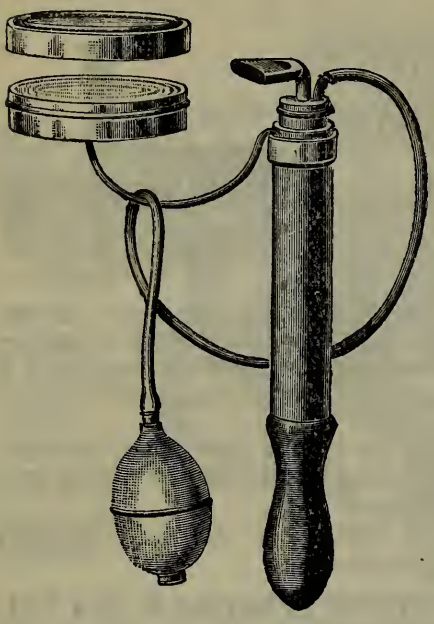
4 x 6 feet	$2 50
5 x 6 "	2 75
6 x 6 "	3 00
6 x 7 "	3 50
6 x 8 "	4 00

These sizes may be sent by mail on receipt of 35c. extra.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

THE LITTLE GIANT

Repeating Flash Lamp.



Patented September 2, 1890.

SAFE,

CONVENIENT

AND

POWERFUL.

Embodying the same principle as the Standard lamp, and producing a number of intensely brilliant flashes from one charge.

Price, Boxed, $2.50.



THE

STANDARD FLASH LAMP

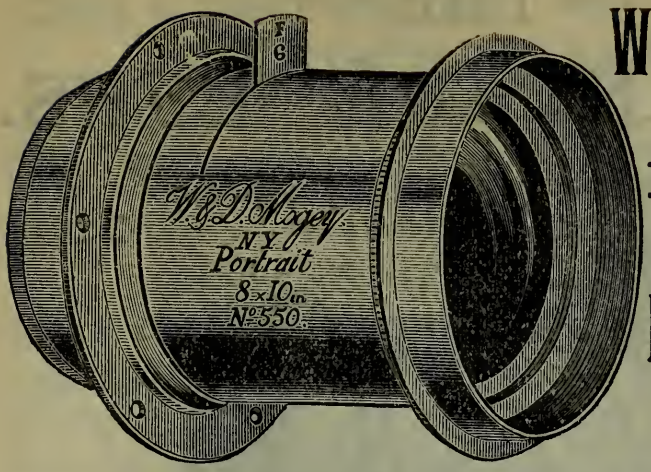
(PATENTED.)

This lamp gives a continuous or intermitting flash, and having an Argand flame box insures the complete consumption of powder with minimum smoke. It is for amateur or professional use.

Two or more of these lamps can be flashed instantaneously from different points.

Price, $4.50.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.



W. & D. MOGEY,

Manufacturers of

HIGH GRADE Portrait and Landscape

LENSES.

With Working Intensity from *F-4.*

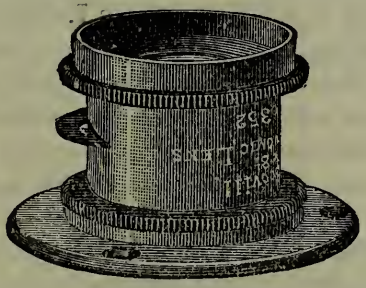
The highest quality of Lenses obtainable for Portraits, Groups, Landscapes, Architectural work and Copying, being absolutely free from distortion.

Lenses sent on approval to responsible parties.

Send for Catalogue of Lenses.

418 West 27th Street, New York.

The Scovill Economic Lenses.



These Lenses are intended to fill the want experienced by thousands of successful workers with the Waterbury Lens for a good, low-priced Rectilinear Wide-Angle Lens, whereby they can gain artistic effects in perspective at short distances.

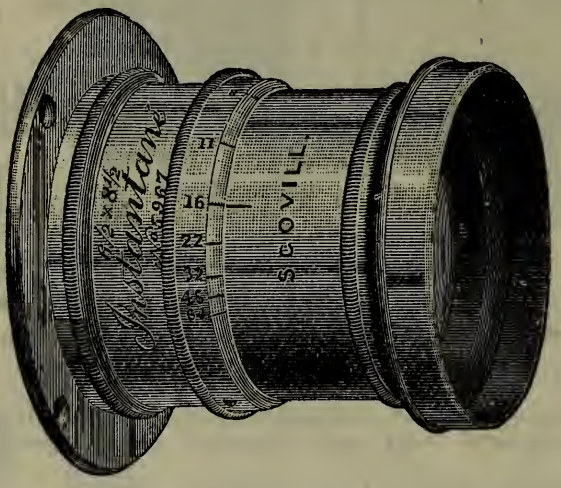
PRICE SCOVILL ECONOMIC LENSES.

No.	Size of Plate.	Back Focus.	Equivalent Focus.	Price.
2	5 x 8	5 inches.	5½ inches.	$12 00
3	6½ x 8½	6 "	6½ "	15 00
4	8 x 10	8 "	8½ "	20 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

THE
INSTANTANÉ LENS.

With Aluminum Mount and Iris Diaphragm.



The several lenses which form the combination of the Instantané are ground from the newly invented glass which has found such prompt recognition in Europe. By reason of the crystalline purity and whiteness of this glass, the Instantané will be found to answer the most difficult requirements in *Speed*, and to work satisfactorily when others fail.

Having such a remarkably brilliant, yet soft illumination, this lens will be found vastly superior to all others of the Rectilinear class for Portraits. Used with the full opening, it takes a portrait of very superior quality.

The Instantané Lens is perfectly Rectilinear, and entirely free from astigmatism, even when used with its full aperture. It has the most remarkable depth of focus ever produced in any lens of the character.

The Instantané is one of the few lenses that are really Aplanatic. It is guaranteed not only to cover the size plate for which it is sold, but to do this without the least loss of definition on the edge of the plate.

It has a good field, although not so forced a capacity as some, resulting in a considerably larger image of the principal object than any other lens of its size would yield, besides absolute freedom from any distortion whatever.

Price List of Instantané Lenses.

		Equiv. Focus.	
No. 1, for 4 x 5	size, instantaneous or timed photographs	6 inches	$30 00
No. 2, for 5 x 8	size	8 "	35 00
No. 3, " 6½x 8½	"	10 "	50 00
No. 4, " 8 x10	"	12 "	60 00

4x5 Instantané Lens, with Inst. Shutter and Iris Diaphragm, price $40.00.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

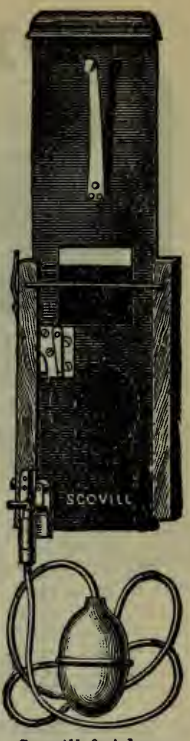
SCOVILL & ADAMS TIME AND INSTANTANEOUS SHUTTER.

That the substitution of a pneumatic release for the ordinary trigger on a wood drop-shutter greatly enhances its value, "goes without saying."

THE SCOVILL & ADAMS TIME AND INSTANTANEOUS SHUTTER

Is Fitted with Pneumatic Attachment,

which may be worked at a considerable distance from the Camera, thus enabling the operator to form part of a group or to be included in a view he is photographing. This Shutter may be used for either timed or instantaneous exposures; the change is made by simply moving a switch.

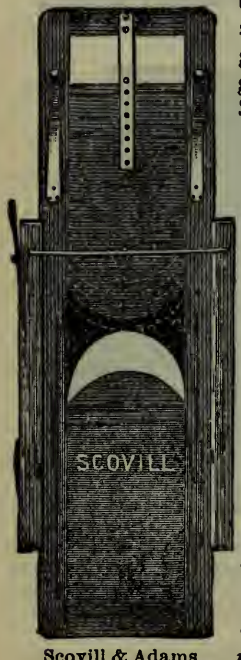


Scovill & Adams Safety Shutter, with Time and Instantaneous Attachment.

Scovill & Adams Universal Safety Shutters.

This Shutter is styled Universal, not only because more of the Scovill & Adams Safety Shutters are in use than of any other pattern, but because it can be arranged with a variety of openings, from ¼ to 4 inches at the centre, as shown by the dotted lines of the accompanying illustration. Uniform distribution of light over the plate is insured by the form of opening.

The brakes on all these Shutters make them safe to use, by preventing a recoil with the resulting double exposure, and the jarring common to many shutters, which in time breaks apart the glasses of a Lens where cemented together—hence the designation "Safety Shutters."

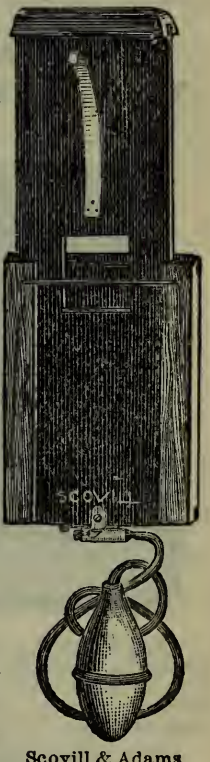


Scovill & Adams Universal Shutter.

PRICE LIST.

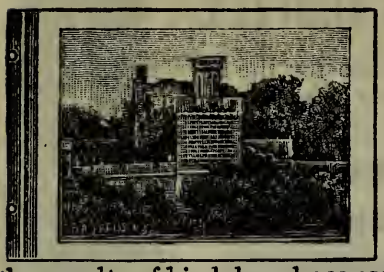
No.	Width of Opening in Slide.	Scovill & Adams Universal Shutters.	Universal Shutters, with Pneumatic Release.	Scovill & Adams Safety Shutters.	Safety Shutters, with Pneumatic Release.	Universal Time and Instantaneous Shutter with Pneumatic Release.
1	1¼ ins.	$2.70	$4.20	$1.20	$2.70	$4.70
2	1½ "	2.80	4.30	1.30	2.80	4.80
3	1¾ "	2.90	4.40	1.40	2.90	4.90
4	2 "	3.00	4.50	1.50	3.00	5.00
5	2½ "	3.10	4.60	1.60	3.10	5.10
6	3 "	3.25	4.75	1.75	3.25	5.25

When ordering these Shutters, exact diameter of hood of Lens should be given, so that the proper circular opening may be cut out to exactly fit hood of Lens.



Scovill & Adams Safety Shutter with Pneumatic Release.

HOWARD · ALBUMS.



This cut illustrates a single card with picture mounted, ready for binding into the album.

A collection of 25 or 50 cards are bound together in an album by a strong binding cord suitably attached to the handsome covers.

This method of making an album affords the amateur the best means of preserving the results of his labor, because each picture may be finished before putting the card in the album. The arrangement of the pictures may also be altered at will—if a single card is spoiled the whole album is not ruined. If a picture is taken out, it can be quickly and readily done without injury to the volume.

PRICE OF HOWARD ALBUMS.

Full Cloth, Embossed, Gold Label, with A. M. Collins Manufacturing Co.'s No. 1 Cards.

		With 25 Collins Cards.
No. 1 — 6x 7 Cards, for	4 x 5 Photographs	$1 25
" 2 — 7x10 " "	5 x 8 "	1 50
" 2½— 8x10 " "	6½x 8½ "	2 00
" 3 —10x12 " "	6½x 8½ "	2 25
" 4 —11x14 " "	8 x10 "	2 50

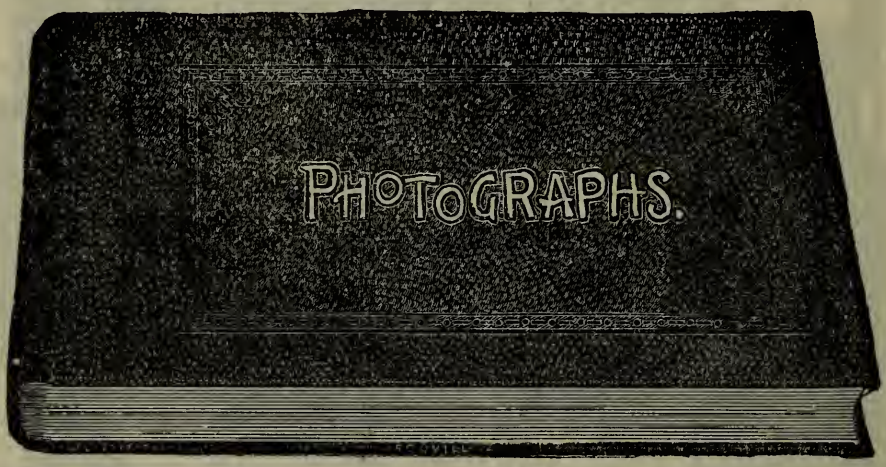
Morocco, Half Leather, Extra Gold Finish, with A. M. Collins Manufacturing Co.'s Cards. Boxed.

		With 25 Collins Cards.	With 50 Collins Cards.
No. 5— 7x10 Cards, for	5 x 8 Photographs	$2 00	No. 11—$3 50
" 6— 8x10 " "	6½x 8½ "	2 50	" 12— 4 00
" 7—10x12 " "	6½x 8½ "	3 00	" 13 - 4 75
" 8—11x14 " "	8 x10 "	3 50	" 14— 5 50
" 9—14x17 " "	10x12 or 11x14	5 50	" 15— 9 00
" 10—16x20 " "	11x14 or 14x17	7 75	" 16—11 00

HOWARD ALBUMS

With Interchangeable Cards for Photographs.

(PATENTED AND LABEL REGISTERED.)



The Howard Album, with interchangeable cards, is the latest novelty in the way of an album for mounting photographs. In handsomely embossed covers are bound 25 of Collins' cards, which are chemically pure from all matter that would injure the photographs. In the mode of binding, and their interchangeable feature, lies the difference between this and other Albums.

Each card is mounted independently with a metallic bearing surface at the outer edge, protecting the holes through which the binding cord passes from tearing out.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

— THE —

AMERICAN OPTICAL COMPANY'S

APPARATUS,

Either for Studio use or for Out-door Photography,

HAS NEVER BEEN EXCELLED OR EVEN EQUALLED

In Variety of Design, Durability of Construction, and in Fineness of Finish.

The Boston Imperial Camera is now the most popular of the numerous styles of Studio Cameras.

Of the View Cameras, the Irving and Star Reversible Back-View Cameras and the Revolving Back-View Cameras are the most popular.

In Hand Cameras and Amateur Outfits, the styles are so numerous that the latest catalogue must be consulted to get a fair idea of them.

The American Optical Company's Apparatus

Is sold by all the leading photographic merchants in this country, Canada, West Indies, South America, Australia, Great Britain, Russia, Mexico, and in many other parts of the globe. Consult the latest descriptive catalogue; it is sent without charge by

THE SCOVILL & ADAMS COMPANY,

423 Broome Street, New York.

THE HENRY CLAY CAMERA.

This is the only Double-Shifting and Swing-Front Hand Camera.



The case is leather-covered, and when closed there is no finder visible, or openings elsewhere, to indicate that the Camera mechanism is concealed inside.

To open the Camera, press on the knob visible on the front, thus allowing the front to slide and then swing under the bottom of the Camera. The platform or bed of the Camera is carried with this board, and, by turning the wheel, the bed is made perfectly rigid. It will at once be apparent how the front may be racked outward until the front end of it is over the lines which indicate the focus for various distances. The figure 60 on the focusing scale indicates the focus for 60 feet or beyond. The finder of the Camera is now placed on the top of the front board, and is therefore always at the same angle as the lens; the finder is a reversible one, which may be turned when the Camera is fastened to a tripod, or is held, not with the handle upward, but with the handle on the side, in order to secure a vertical instead of a horizontal view. The front board is arranged to slide upward when taking a tall building, church spire, or any high object, and it is also arranged to swing, to still further aid in that endeavor.

By an ingenious arrangement the swing and vertical sliding adjustments may be made to work when the Camera is turned over and used horizontally.

One of the advantages of this Camera, when used in the hand, is in the taking of street scenes from an elevated position and having the lines of the building straight, while the subjects taken may be near by.

On the same principle, objects situated above the Camera level may be taken by reversing the position of lens and finder.

PRICE.

5 x 7 Henry Clay Camera complete, with Instantaneous Lens and Plain Shutter, . .	$50 00
Ditto, with Pneumatic Release, ...	55 00
Ditto, with Roll-Holder and one Double Plate or Film-Holder, ...	70 00

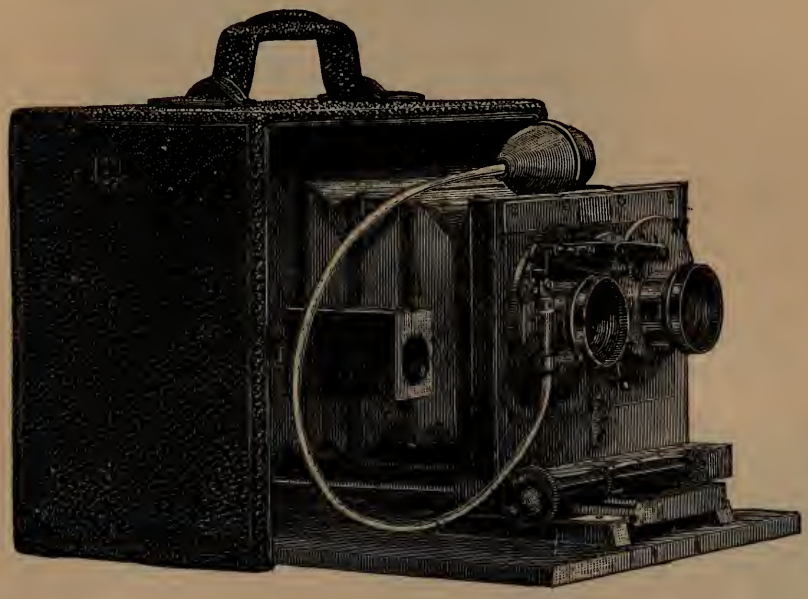
MANUFACTURED BY THE

AMERICAN OPTICAL COMPANY.

THE SCOVILL & ADAMS CO., Proprietors.

THE 5 x 7 HENRY CLAY
STEREOSCOPIC CAMERA

FOR TRIPOD AND HAND USE.



IT is commonly known that of all pictures, those which are arranged to give the stereoscopic effect when viewed in a stereoscope convey the true impression of perspective and solidity.

It seems strange, indeed, that of the myriads of instantaneous pictures made, so few are taken with reference to their future use in connection with the stereoscope, *for it is only by that means that the idea of perspective and solidity can be conveyed.* We can only assign as the reason the present almost universal use of hand cameras, and that none of them have, up to this time, been arranged for stereoscopic pictures.

There is a much over-worked phrase—"the long-felt want," but we think that just that, literally, will be met by the new hand camera which the American Optical Company have just finished.

This camera measures eight inches high, nine inches long and five inches wide; its weight is about five pounds. It has a screw plate underneath, so that it may be used with a tripod. It has a door in the back of the case, and through that opening the image thrown by the lenses may be seen on the ground-glass focusing screen.

The illustration shows the appearance of the camera when open. The pair of Rapid Rectilinear Lenses is fitted with a triplex stereoscopic shutter with pneumatic release, made by the Prosch Manufacturing Company.

The camera is furnished with a focusing scale and a reversible finder. Either half of the stereo. negatives when cut in two are of a size suitable for making lantern slides from.

This camera may also be used to take a single picture of the size of the ground-glass focusing screen (5x7 inches), either vertical or horizontal. In the former case the reversible finder comes into use. The septum which divides the camera inside is arranged so that it may be easily taken out; the stereo. lenses are mounted on a removable front and an extra front is furnished on which may be placed any lens of not over seven and a half inches equivalent focus.

PRICE, with a pair of Rapid Rectilinear Lenses and Prosch Stereoscopic Shutter with Pneumatic Release, - - - - - - $75.00

This camera can also be made with vertical sliding and swing front. By means of the former the proportion of sky and foreground may be adjusted; the latter permits the taking of subjects which may be either above or below the level of the camera and still preserve the lines vertical.

PRICE, with a pair of Rapid Rectilinear Lenses and Prosch Stereoscopic Shutter with Pneumatic Release, and with vertical sliding and swing front $80.00

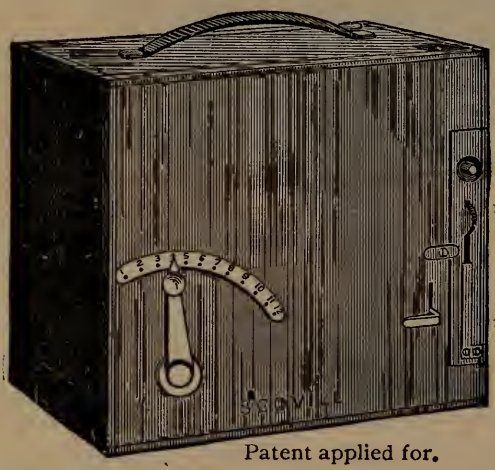
A 5x7 Roll Holder for Transparent Films can be furnished with either of the above forms of this camera for $15.00 additional. This addition would make the case about two inches wider and one-quarter inch higher.

ADVILL CAMERAS

FOR CUT FILMS.

DIRECTIONS. { *SET THE SHUTTER.*
TOUCH THE RELEASE.
MOVE THE INDICATOR.

There are many amateur photographers who do not want to be encumbered with glass plates, nor do they want to use films in rolls, as in many roll holders one hundred exposures must be made before any portion of the roll can be developed, and the finished pictures conveniently made. Our



Patent applied for.

Advill Cameras

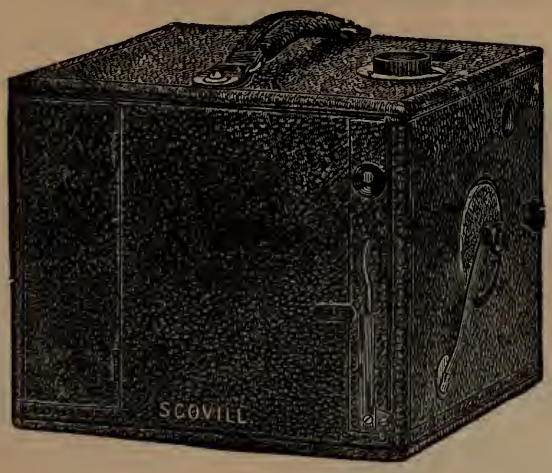
—made for either twelve or eighteen cut films—are a happy medium between these extremes. Each film carrier has a number corresponding to a similar number on the outside of the camera. After exposing one film move the indicator along from one number to the next number to get the exposed film out of the way and the unexposed film into place.

The camera is fitted with an Instantaneous Lens, which has an arrangement connected with it for changing the stops in the Lens without opening the camera. The shutter is arranged for both timed and instantaneous exposures. Attached to the leather-covered case there is a recessed finder.

	PRICE.
No. 1, for 12 4 x 5 Films, - - - -	$20 00
No. 3, for 12 4 x 5 Glass Plates, - - -	25 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

THE WATERBURY DETECTIVE CAMERAS.



MANUFACTURED BY THE AMERICAN OPTICAL COMPANY.

Timed and Instantaneous Photographs. This is the only Detective Camera which is as well adapted for making timed views as for photographing quickly moving objects. The negatives produced are of such sharpness that they may be enlarged to almost any size. It is

The only Detective Camera made with plate for tripod, and with ground-glass the full size of the plate, just as in an ordinary view camera. This ground-glass is where it cannot easily be broken.

The Recessed Finder shows *the same image* as is included on the ground-glass, though diminished in size. Without this accurate finder, one cannot be sure of what is taken in or left out of an instantaneous photograph.

The Focusing Scale is beside the Finder, where it may be readily seen and adjusted.

PRICE LIST.

	Leather Covered.
4 x 5 Waterbury Detective Camera, with 2 Double Holders.....	$25 00
5 x 7 " " " " 2 "	40 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

BOOK CAMERA.

In introducing our New Book Camera, we present a photographic instrument which we think will be appreciated by the ladies as well as by the opposite sex. Our chief aim has been to manufacture a camera that is compact and light, and, at the same time, not have the appearance of the ordinary square hand-camera which is now almost universally recognized and avoided. This has been accomplished, after careful study, and we take great pleasure in recommending our new



BOOK CAMERA.

The general appearance of this new camera is of three leather-covered books encircled by a strap. Attached to this strap is a neat handle by which to carry the camera. No lady or gentleman need have any fear that this parcel will attract attention as a camera for it certainly looks as much unlike a camera as anything can, and it is a very striking counterfeit of a parcel of three *bona-fide* books.

The lens for this ingenious instrument is a rectilinear combination, of the wide-angle variety, with interchangeable stops made expressly for this camera, and is superior to anything yet offered at its very low price.

The construction of the shutter is after the leaf pattern, and is located between the lens glasses—a feature not used in ordinary hand cameras. This gives a wider range of angle and does away with the use of a stopper for the lens.

The Outfit consists of a Camera and lens, with leaf shutter,

One 4 x 5 double Film plate holder,

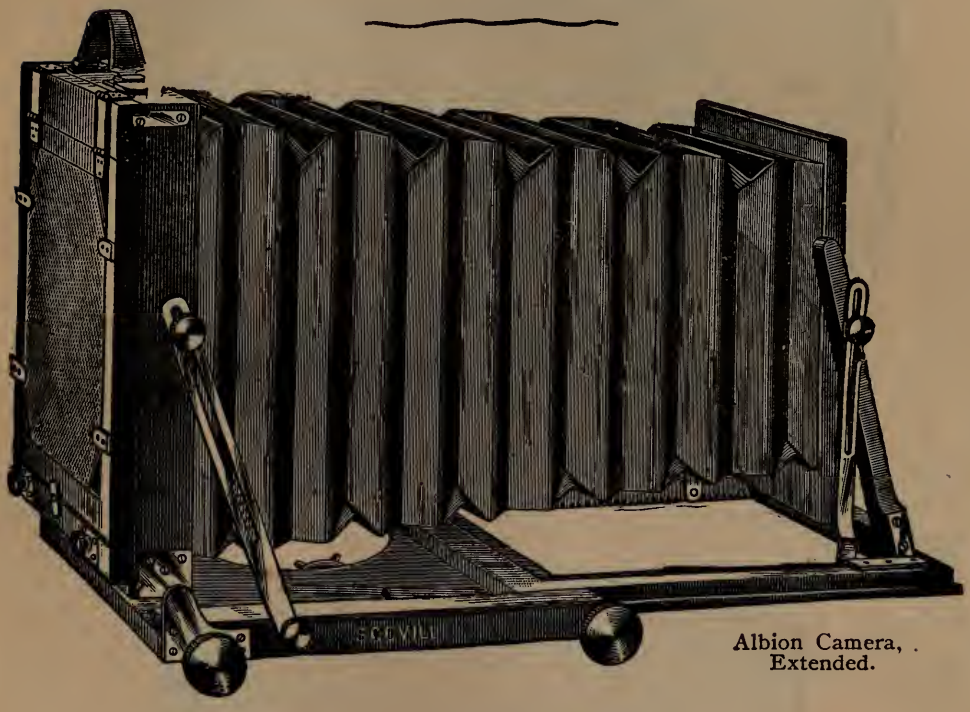
One 4 x 5 single dry plate holder,

One canvas case with shoulder straps (the canvas case is only 10½ x 6 x 7, and will accommodate five extra plate holders).

Price of Outfit, complete, - $25.00.

THE

Albion Cameras.



Albion Camera, Extended.



Showing Turn-table for Tripod.

PRICE LIST
OF
Albion Cameras.

Each with Albion Tripod and Extra Fine Canvas Carrying Case.

No.	Size.	Price.
550.	4¾ x 6½	$47 00
551.	5 x 7	48 00
552.	5 x 8	49 00
553.	6½ x 8½	50 00
552.	8 x 10	60 00

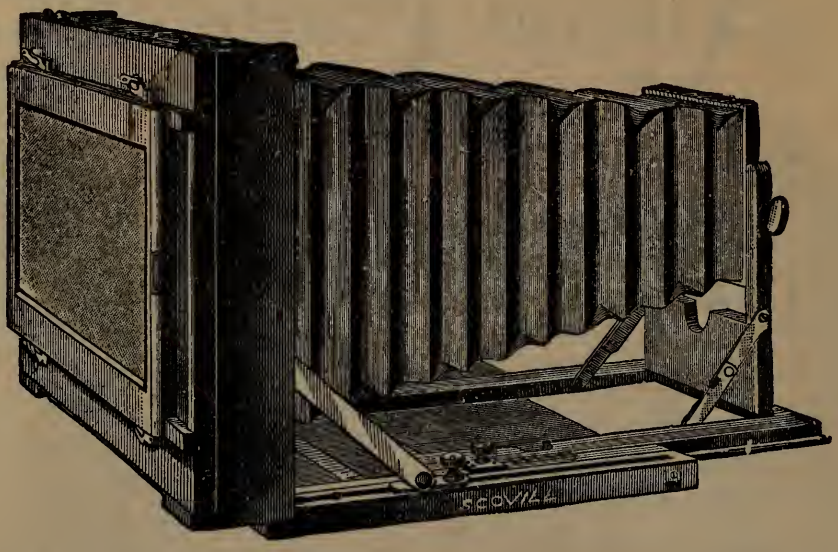
MANUFACTURED BY

THE SCOVILL & ADAMS CO.

Send for Descriptive Circular.

IRVING VIEW CAMERAS.

The IRVING Camera recently introduced by the American Optical Co. was awarded the highest prize by the judges at the American Institute Fair. They expressed themselves as unable to see how a more complete, compact, light, handsome and serviceable camera could be made.



The Irving Cameras all have swing front in addition to swing back, vertical shifting front board. They have the Howe patent reversible back, fitted with self-locking ground-glass frame, and when desired, celluloid is used in place of glass for the focusing screen.

One of the best features of the camera is the absence of detachable screws. An idea of this is conveyed by the illustrations showing the camera when extended and when folded.



A superb canvas case, the finest ever made, is supplied with each one of the Irving Cameras. Price list is as follows:

	Single Swing.	Double Swing.		Single Swing.	Double Swing.
4 x 5	$27.00	$32.00	10 x 12	60.00	$65.00
5 x 7	33.00	38.00	11 x 14	65.00	70.00
5 x 8	35.00	40.00	14 x 17	75.00	80.00
6½ x 8½	40.00	45.00	17 x 20	85.00	90.00
8 x 10	45.00	50.00	18 x 22	95.00	100.00

In order to convey an idea of the lightness of these cameras, it is sufficient to say that the 5 x 8 size camera weighs only 3 lbs.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.



W. Kurtz, Photo. & Engraver.

THE CHASE.

O. C. CO.'S
SPECIAL BLUE PAPER.

We now mail this paper to every State in the Union and Canada.

PRICE, 25c. PER YARD.

(27 in. wide) cut to any size. Postage paid.

SOLD ONLY AT 163 BROADWAY.

O. C. CO.'S
SPECIAL SOLUTIONS.

The BEST in the land, and go furthest.

Hydrochinone, 30c.
Pyro and Potash, 60c.
Toning Solution, 90c.

SOLD ONLY AT 163 BROADWAY.

KODAKS—New Styles and Sizes, $6.00 to $65.00.

KODAK FILMS, KODAK PLATE ATTACHMENTS, KODAK INSTRUCTIONS.

HAWKEYES—New Model Regular and Folding.

KAMARETS, PREMIERS, HENRY CLAYS, WATERBURYS, TOM THUMBS, BULLS-EYES,

ALWAYS IN STOCK. KODAKS RELOADED WHILE YOU WAIT.

O. C. CO.'S
Printing and Developing

MOUNTING IN ALBUMS, ETC., AT EASTMAN'S PRICES.

All Work done Promptly and as agreed

AT 163 BROADWAY.

O. C. CO.'S
Repairs to Kodaks

AND ALL HAND AND TRIPOD CAMERAS Done by skilled workmen.

Send your name for Pocket Catalogue and mention this book

TO 163 BROADWAY.

THE OBRIG CAMERA CO. 163 Broadway, N.Y.

CLEMONS'
New Matt-Surface Paper.

After many years of scientific research a preparation for the salting of plain photographic paper has been discovered, by which method the finest printing results are obtainable. The advantages are apparent to all.

I.—Constant use will not discolor the silver bath.

II.—Will produce the finest detail in printing.

III.—Any desired tone may be obtained from sepia to jet-black with less gold than ever before.

IV.—The "*New Matt-Surface*" paper when sensitized will keep fresh for a long time if properly stored.

V.—The price has not been advanced.

FOR SALE BY

THE SCOVILL & ADAMS COMPANY.

Sample Sheets, by mail, 10 cents each.

Photography on Porcelain Made Easy.

ASK FOR

LUXOTYPE OPALS.

Ready Sensitized, Printing Out, Toning and Fixing, same as Albumen Prints.

LUXOTYPE TRANSPARENCY AND LANTERN PLATES.

No Development, Printing Out, Toning and Fixing as usual.

LUXOTYPE TONING AND FIXING SOLUTION.

LUXOTYPE VARNISH.

For Sale by The Scovill & Adams Company, and all Dealers in Photographic Materials.

MANUFACTURED BY **Pyrophoto Company,**

30 FIRST STREET, NEW YORK.

FOR THE LADIES.

PETITE OUTFIT.

Consisting of 3¼ x 4¼ Single Swing Petite Camera, made of mahogany, polished, with folding platform, patent latch for ditto, double dry-plate holder with registering slides, one jointed adjustable tripod, one 3¼ x 4¼ Optimus Instantaneous Lens.

Price, complete, $25.00.

When sold separately the total cost of the parts of this outfit is $36.00.

MIGNON OUTFIT.

Consisting of 3¼ x 4¼ Mignon Camera, made of mahogany, finely polished, with folding platform, patent latch for ditto, rack and pinion focusing adjustment, double dry-plate holder with registering slides, one jointed adjustable tripod, one 3¼ x 4¼ Optimus Instantaneous Lens.

Price, complete, $36.00.

When sold separately the total cost of the parts of this outfit is $48.00.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.



THE "RATTLER,"

$5 Frank McLaughlin's $5

THIS NEW $5 HAND CAMERA

Is not a toy, as some may have supposed, on account of the remarkably low price at which it is sold, but a good, practical working instrument, one that we can recommend as being superior in every respect to any camera sold at double the price. It will make pictures 4 x 5 size, either snap-shot or on a tripod.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

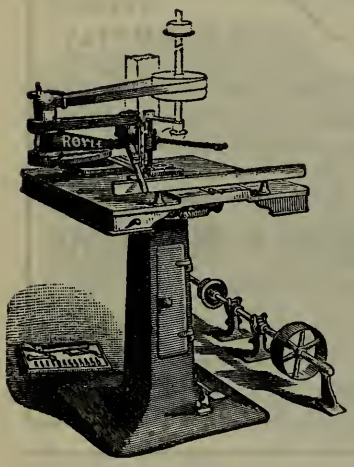
Routing and other Machines

—FOR—

PHOTO-ENGRAVERS

AND

ELECTROTYPERS.



Write for Particulars

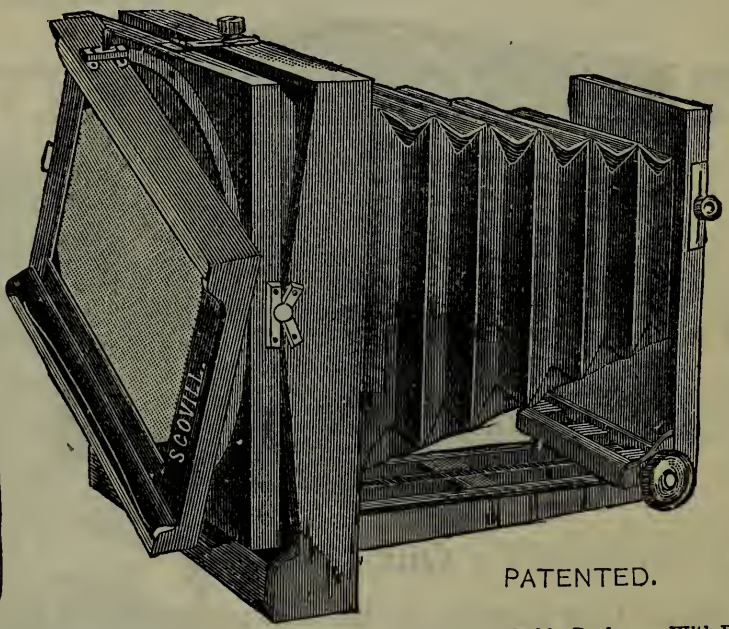
TO

John Royle & Sons

PATERSON, N. J.

SCOVILL REVOLVING BACK CAMERAS

FRONT FOCUS PATTERN.



PATENTED.

FOR SALE BY ALL DEALERS.

SEE REDUCED PRICE-LIST IN NEW AMERICAN OPTICAL CO. CATALOGUE.

No.	REVERSIBLE For View	Sing. Sw.	Doubl. Sw.	With Reversible Back and Holder Extra
120	4 x 5 in.	$27.00	$32.00	
121	4¼ x 5½	29.00	34.00	
122	4¼ x 6½	31.00	36.00	
123	5 x 7	33.00	38.00	
124	5 x 8	35.00	40.00	
125	6½ x 8½	40.00	45.00	
126	8 x10	45.00	50.00	

No.	With Detachable Back. REVERSIBLE For View	Sing. Sw.	Doub. Sw.	With Reversible Back and Holder Extra
127	10X12	$60.00	65.00	
128	11X14	65.00	70.00	$ 90.00
129	14X17	75.00	80.00	105.00
130	17X20	85.00	90.00	115.00
131	18X22	95.00	100.00	130.00
132	20X24	115.00	120.00	150.00

Buy from Dealers or the Scovill & Adams Co.

PROMPT! ❋ PERFECT! PERMANENT!

SOLAR AND ELECTRIC ENLARGEMENTS IN PLATINUM, FOR ARTISTS AND THE TRADE.

A NEW (REDUCED) PRICE LIST.

Size of Print.	Un-mounted.	Mounted.	Size of Print.	Un-mounted.	Mounted.
10 x 12.....	$1 00	$1 25	20 x 24.....	$1 25	$1 75
11 x 14.....	1 00	1 25	22 x 27.....	1 50	2 00
14 x 17.....	1 00	1 25	25 x 30.....	1 50	2 00
16 x 20.....	1 00	1 50	26 x 32.....	2 00	2 50
8 x 22.	1 25	1 75	29 x 36.....	3 00	5 00

S. A. THOMAS,

717 Sixth Ave., NEW YORK.

The Scovill Peerless Dark-Room Lantern.



"This is without question the best Lantern for the photographer's use yet introduced." Such is the report of experts who have had them in use for months.

Why they were agreed in their conclusions:

Because the ventilation is perfect, and danger of overheating overcome.

Because it is constructed so that white light does not escape.

Because it gives ample light for the dark-room.

Because the abundant light does not fog, but does show any spot or blemish in the plate.

Because so much of the light may be thrown into the developing-dish and be shaded from the eyes.

Because it may be used either with coal-oil or candle.

Because the flame may be so quickly controlled by unlatching the door or uncatching the bottom of the Lantern.

PRICE, $2.50.

Buy from Dealers or the Scovill & Adams Company.

THE SCOVILL PREPARED SOLUTIONS, POWDERS, Etc.



S. P. C. Clarifying Solution. Per bottle, $0 50

S. P. C. Reducing Solution. Small bottle, . 50
Large bottle, ... 75
Reduces density in negatives and positives on glass or paper. Can be applied locally to remove halation marks, ghosts, etc.

S. P. C. Hypo Eliminator. (For Removing every trace of Hyposulphite of Soda from Negatives and Prints.) Price, per bottle, with book of testing paper, ... 50

S. P. C. Retouching Fluid. (For Varnished and Unvarnished Negatives.) Price, per bottle, . 25

Magnesium Flash Compound, oz. bottle, 50

Hall's Intensifier. (For Strengthening Weak Negatives.) Price, per bottle, ... 75



S. P. C. Negative Varnish. . Per bottle, 35

French Azotate. (For Toning Prints.) " " 25

Kristaline Varnish, . . . " " 40

S. P. C. Toning Solution. Per package, . . 1 00
Produces the most brilliant tones, ranging from chocolate to black on ready-sensitized paper.

S. P. C. Orthochromatic Solutions.
By which any plate may be rendered color-sensitive.
Price, per package, ... 1 50

Buy from Dealers or the Scovill & Adams Company.

SCOVILL Prepared SOLUTIONS. Powders and Capsules.



JUST INTRODUCED,

S. P. C. Eikoquinole Developer. Price per bottle, $0 35

S. P. C. Eikonogen Developer. Per package, 75

S. P. C. Pyro and Soda Developer. Price per Package, 60

S. P. C. Hydrochinon Developer.

Does not stain the fingers or leave the plate yellow; works equally well with all brands of plates, giving perfect detail, density and brilliancy in the negative. Full directions enclosed in each package. Price, per package, . 60

S. P. C. Pyro and Potash Developer.

Price, per package, ... 60



S. P. C. Bromide Paper Developer

for Star Bromide Paper. Set, ... 75

S. P. C. Restrainer. In accurate dropping bottle, 50

S. P. C. Developing Powders. Per box of 12, 50

Hydrochinon Capsules, . . . per box, 60

Buy from Dealers or the Scovill & Adams Company.

THE SCOVILL

A B C

PHOTOGRAPHIC EQUIPMENTS.



Including LANDSCAPE LENS, DRY-PLATES, DEVELOPING AND PRINTING MATERIALS,

AND ALL NECESSARY REQUISITES FOR MAKING A FINISHED, MOUNTED "BLUE" PRINTED PHOTOGRAPH.

The No. 1 A B C Photographic Equipment consists of view camera for making 3¼x4¼ pictures, with a quick-working lens; 6 rapid dry-plates; 2 japanned iron trays; 2 packages of S. P. C. developer (Nos. 1 and 2); a package of hypo; 1 printing frame; half dozen sheets ferro-prussiate paper; half dozen card mounts; 1 sheet of ruby paper, with full instructions for lighting the dark-room and constructing a ruby lamp; 1 Russell negative clasp.

No. 1—Price, complete $2 00

No. 2 A B C Equipment comprises all that is included in the No. 1 Equipment, and the necessaries to make black and white pictures.

Price, complete $2 50

F. W. Devoe & Co.

Cor. Fulton and William Streets, **NEW YORK.**

MANUFACTURERS OF

ARTISTS' MATERIALS

FINE BRUSHES, CANVAS, OILS AND VARNISHES
PASTEL CANVAS AND CRAYONS
SUPPLIES FOR OIL AND WATER COLOR PAINTING
CRAYON AND CHARCOAL DRAWING, SKETCHING, DESIGNING, ETCHING, ETC.
BOOKS ON ART, STUDIES, ETC.

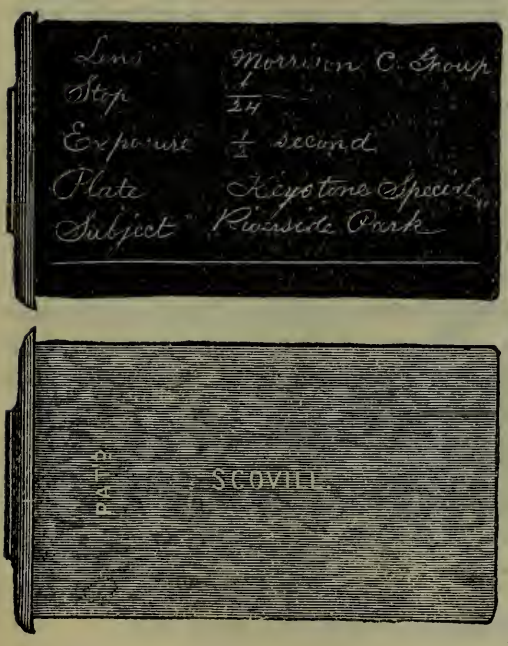
MANUFACTURERS OF THE
B. P. V. Outfits for Chromo-Photography or Crystal Painting.

IMPORTERS OF
Steinbach Paper in Rolls, Superior Quality Crayons and Pencils, Photograph Colors.

SUPPLIES FOR ARTIST-PHOTOGRAPHERS.

CATALOGUES ON APPLICATION.

REGISTERING SLIDES.



IN the pleasure or excitement attendant upon picture-taking, holders and slides have been so changed about that the note-book afforded no clue to their identity. All photographers, whether professional or amateur, who have in time past puzzled their brains in the endeavor to solve such vexatious questions as these:

"Have I or have I not exposed that plate?"

"If exposed, was the plate used for that prized picture?"

"Shall I incur the risk of making a double exposure?"

henceforth will have themselves only to find fault with if they do not procure and use in their dry-plate holders the patent registering slides, or as they have been called "Record Slides." These can be written upon with slate or lead pencil *ad libitum*, and the writing erased without injury to them.

Patent Registering Slides are supplied with all American Optical Co. Dry Plate Cameras and Amateur Outfits up to 10 x 12 size without addition to price list.

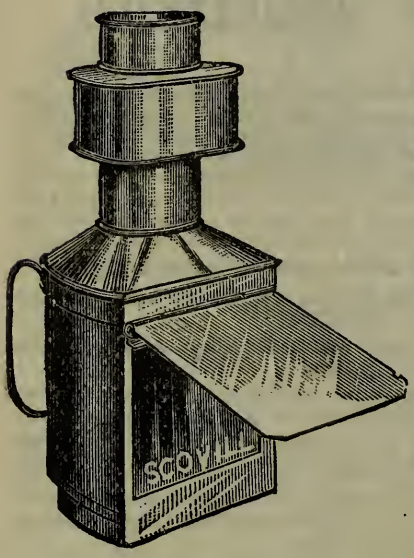
ROCHESTER, N. Y.

WE issue no Catalogue at heavy expense. We have no Agent on the road; but we sell everything Photographic and give you the benefit of our reduced expenses. Try us with an order.

We develop and print Kodak and other negatives in the best manner and at reasonable prices. Send for Price List of this class of work.

Hovey Brothers,

158 E. MAIN STREET.



The W. I. A. PETITE

DRY-PLATE LANTERN

Will be found quite superior to any lantern previously offered at a smaller price than the Scovill Peerless Lantern. It is much to be preferred above an oil consumer, on account of safety and cleanliness. The light emitted is abundant, and the ventilation perfect. When not in use the chimney of this Petite Lantern may be taken off and placed inside over the candle.

PRICE, $1.25.

Buy from Dealers or the Scovill & Adams Company.

S. T. Blessing's

STAR AND CRESCENT

Photo Supply Houses,

NEW ORLEANS, LA., AND DALLAS, TEXAS.

Everything requisite for the Professional and Amateur will be found at these houses at the lowest market prices.

SOLE IMPORTER OF

"ACME" Rapid Lenses in four styles: Portrait, Euryscope, Wide-Angle and Rectilinear.

The best Lenses for the money. ***Over 500 sold first four years.***

Send for Illustrated Catalogue, 1892.

SCOVILL PRINT-ROLLERS.

SUPERIOR TO ANYTHING IN THE MARKET

THE Scovill Print-Roller is especially designed to be used in the place of the ordinary Squeegee in working film and paper negatives, bromide prints, for removing surplus water from albumen prints before mounting, etc.

It is neatly constructed with black walnut handle, brass trimmings, and a heavily-covered rubber roller.

It will be found a very handy tool alike to the professional and amateur photographer.



Price, 8 inch, . $1.00 each.
" 12 " . 1.50 "

Buy from Dealers or the Scovill & Adams Company.

SOLE AMERICAN AGENTS. DETROIT, MICH.

ALLEN BROTHERS,

SEND FOR PRICE LISTS AND TESTIMONIALS.

or for any purpose, are unrivalled.

Portraits, Landscapes, Wide Angle, Copying,

THE SUTER LENSES FOR

THE MORRISON

WIDE-ANGLE VIEW LENSES.

These Lenses are absolutely rectilinear; they are the most rapid, and are universally conceded to be the BEST WIDE-ANGLE LENSES MADE.

No.	Diameter of Lens.	Size of Plate.	Equivalent Focus.	Price.	
0	1 inch	3¼ x 2¼ inch		$20 00	
3	1 "	4⅛ x 4¼ "		25 00	
4.	1 "	5 x 8 "	5¼ inch, each,	25 00	These 3 sizes will fit into 1 flange.
5.	1 "	6½ x 8 "	6½ " "	25 00	
6.	1 "	8 x 10 "	8 " "	30 00	
7.	1¼ "	11 x 14 "	10½ " "	40 00	These 2 sizes will fit into 1 flange.
8.	1¼ "	14 x 17 "	14 " "	50 00	
9.	1½ "	17 x 20 "	17 " "	60 00	These 3 sizes will fit into 1 flange.
10.	1½ "	20 x 24 "	22 " "	80 00	
11.	1½ "	25 x 30 "	28 " "	100 00	

☞ Nos. 1 to 6 are all made in matched pairs for stereoscopic work. The shorter focused Lenses are especially adapted for street and other views in confined situations. For general purposes, a pair of No. 5 Lenses will be found most useful.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

REDUCTION IN PRICES!

"Imperial" Magnesium Flash Lamp,

$4.50;

"Now Then," or Flash Light Wonder,

$2.00.

The large demand, and improved facilities for manufacture, has made the above reduced prices possible.

GET THE BEST!

Awarded Medal of Excellence by American Institute.

Patented Dec. 17, 1889. Beware of Infringements.

For sale by all Dealers.

MANUFACTURED BY

H. B. SHELDON, Jr., 134 Pearl Street, N. Y.

The ⁘ Scovill ⁘ Magnesium ⁘ Compound

IS ENTIRELY FREE FROM POISONOUS INGREDIENTS.

In order to demonstrate this, quantities have been eaten at various times. It has often been pounded in a mortar to show that it does not explode.

The results obtained by using our Magnesium Compound have never been surpassed.

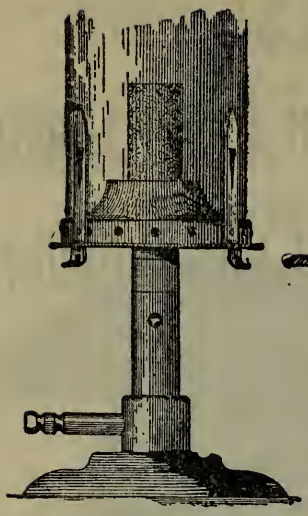
PRICE OF SCOVILL MAGNESIUM COMPOUND.

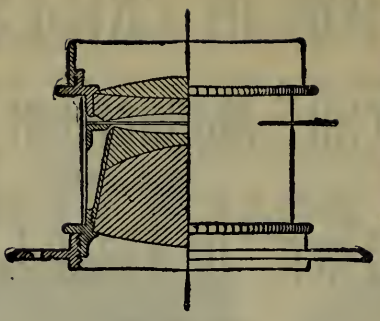
In ounce bottles, with fuses	$ 50
In quarter pound cans, with fuses	1 40
In half " " " "	2 65
In one " " " "	5 00
In five " " " "	20 00

PRICE OF SCOVILL MAGNESIUM CARTRIDGES.

	Per Pkg.	Per Gro.
No. 1, Small Size, in packages of six	$0 25	$6 00
No. 2, Medium, " "	40	9 00
No. 2½, in packages of six	60	13 00
No. 3, " "	75	17 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.



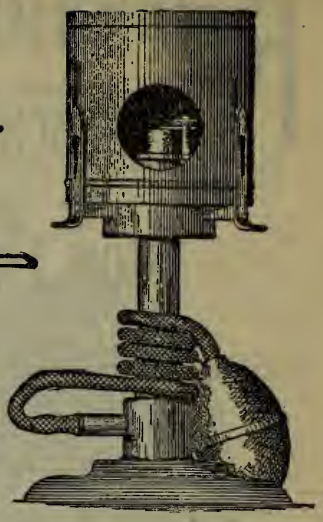


UNRIVALLED

STEINHEIL LENSES.

"Aladdin" Dark-Room Lamp

Entirely new system of dark-room illumination.



"Aladdin" Lamp, $3.50

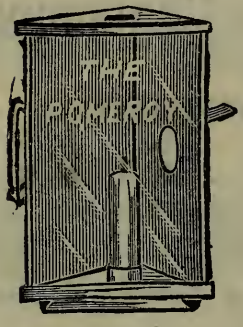
"Safety Igniter," $4.00

"Safety" Flash Igniter, } The only one to burn without a flame.

Write for full illustrated catalogues and price lists to your dealer or to

H. G. RAMSPERGER & CO., Sole Agents,

180 Pearl Street, NEW YORK.



HAS RUBY GLASS.
Size, 6½ x 4¼ Inches.

We would respectfully call your attention to

"THE POMEROY DARK-ROOM LAMP,"

which has taken a front rank as a lamp of this kind.

1st.—Because it has perfect ventilation.

2d.—Because being triangular in form it can be folded without complication, and occupies a space not greater than Webster's Pocket Dictionary, 6½ x 4¼ inches

3d.—Because it has a socket to take candles, which may be procured in any part of the country; the annoyance of loading one's self with a supply is avoided.

4th.—Because there are no small chimneys to be broken or cleaned, nor adjusting of wicks.

5th.—Because it stands more firmly than all others, and is of the proper size, and gives proper light.

6th.—Because it has folding handles, and may be carried without burning one's fingers.

7th.—Because the flame is so readily controlled, having light-tight slide at side.

8th.—Because it comes all complete in a pasteboard box, less candle, for 50 cents, and can be mailed to any part of the United States for 10 cents postage extra.

FOR SALE BY

THE SCOVILL & ADAMS COMPANY.

FOR SNAP SHOTS

FOR PORTRAITS

FOR INTERIORS

AN ALL 'ROUND

THE PREMIER CAMERA.

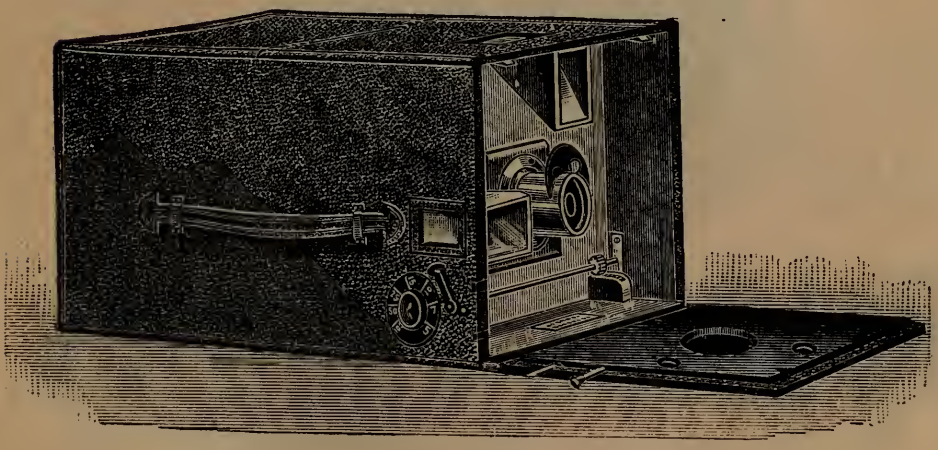
FOR VIEWS

FOR GROUPS

FOR FLASHLIGHTS

DON'T BUY A CAMERA

BEFORE SEEING



THE LATEST IMPROVED

PREMIER.

A MARVEL OF SIMPLICITY.

Glass Plates, Cut or Roll Films may all be used, and the change from one to the other made in a few seconds.

EVERY INSTRUMENT GUARANTEED.

FOR CATALOGUES ADDRESS:

ROCHESTER OPTICAL CO.

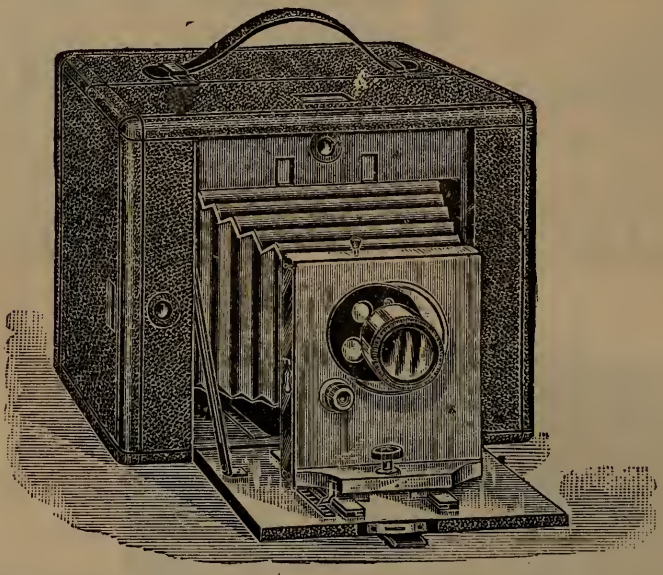
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One Moment!

HAVE YOU SEEN THE VERY LATEST

CAMERA?

WE REFER, OF COURSE, TO THE



FOLDING PREMIER.

SURE TO BE A LEADER FOR ALL
DESIRING A COMBINED

HAND AND TRIPOD CAMERA.

Glass Plates or Film may be used.

Camera carries four or six Double Plate Holders, or Roll Holder, as desired.

Made in sizes 4 x 5, 5 x 7, 6½ x 8½.

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ROCHESTER OPTICAL CO.

ROCHESTER, N. Y.

THE FINEST CAMERA : : IN THE : : AMERICAN MARKET

THE UNIVERSAL



PARTIALLY FOLDED.

The 6½ x 8½ measures only 2¾ inches thick when closed, yet has a draw of 20 inches.

WEIGHT ONLY 5 POUNDS.

MADE IN ALL SIZES.



FOLDED.

PRICE LIST

With Combination Tripod, Perfection Holder and Canvas Case.

	Single Swing.	Double Swing.
3¼ x 4¼	$27.00	$29.00
4 x 5	28.00	30.00
4¼ x 6½	30.00	32.00
5 x 7	33.00	35.00
5 x 8	36.00	38.00

	Single Swing.	Double Swing
6½ x 8½	$40.00	$43.00
8 x 10	45.00	48.00
10 x 12	52.00	56.00
11 x 14	60.00	65.00

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ROCHESTER OPTICAL CO.

ROCHESTER, N. Y.

Simplicity,
Durability,
Accuracy,
Fine Finish.

4 PROMINENT FEATURES

Noticeable in the Productions of the

Rochester Optical Co.

ROCHESTER, N. Y.

MANUFACTURERS OF

Photographic Apparatus

Of the Finest Quality.

SOLE MAKERS OF

PREMIER CAMERAS . .
UNIVERSAL CAMERAS .
IDEAL CAMERAS . . .
. STANDARD CAMERAS
NEW MODEL CAMERAS
. . MIDGET CAMERAS

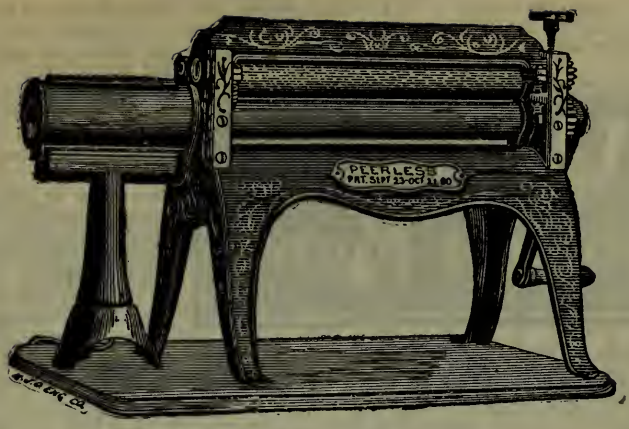
And other Specialties.

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Our Goods are for sale by all First-class Dealers in the United States and Canada.

See three preceding pages.

THE



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"PEERLESS" BURNISHERS

OLEUM AND ELECTRIC.

LATEST Inventions of our Mr. W. H. Boles, inventor of the "Acme."

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SYRACUSE, N. Y., U. S. A.

THE SCOVILL OUTFIT,

For Photographing with a Microscope.



SCOVILL'S PHOTO-MICROSCOPIC EQUIPMENT,

CONSISTING OF

1 Scovill Special Half-Plate Camera.
1 Multum in Parvo Lantern, with Double Condenser.
1 dozen 4½ x 5½ size B Keystone Plates to make Negatives; also
1 dozen 3½ x 4½ size A Plates for Transparencies.

PRICE COMPLETE, $18.00.

The presumption is that you are provided with a microscope. If not, we recommend the purchase of one from a regular dealer in microscopical goods.

From the Photo-American.—"We cannot speak too emphatically of the value of that little instrument called the Watkins Exposure Meter, and no amateur can possibly put in a more profitable half-hour's study than that necessary to obtain an understanding of its working.

Watkins Exposure Meter

"Usually, there is too much hap-hazard work about exposing, and the disappointments arising from bad guesses as to the strength of the light, and resulting in loss of plates, loss of pictures, loss of temper and general disgust, constitute the deepest, darkest shadows of photography.

"With the Watkins Exposure Meter these conditions are all changed; an exposure is a sure thing, and every plate exposed results in a negative, and every negative is perfect."

All dealers sell these meters, and every amateur should have one and understand its use

"Worthitsweightingold"

PRICES GREATLY REDUCED.

Regular Meters, $5.00. Special Meters (for copying and enlarging) $6.50.
Note Books, 50 cents. Extra Refills, 25 cents.

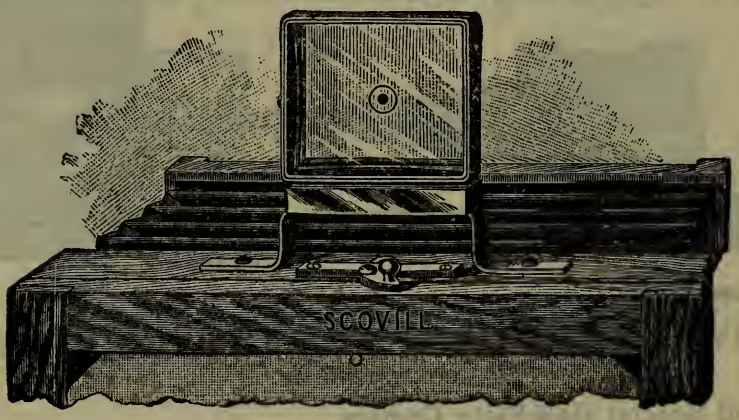
If your dealer is not able to supply you write direct to

C. Reinschild Importing and Manufacturing Co.,
61st St. & Park Ave., New York.

SCOVILL MAGIC FINDERS,

(PATENTED.)

Unequaled for Landscape Photography.



One sees through them a marvelously clear *non-reversed* image *the exact proportion* of the reversed one on the ground-glass. The Magic Finders are light, ornamental, easily adjusted and detached, and pronounced a great convenience by view takers.

PRICE LIST.

No. 1, for 4x5 Camera.....$1 50	No. 3, for 6½x 8½ Camera...$2 25
" 2, " 5x8 " 1 75	" 4, " 8 x 10 " ... 2 75

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A COMPLETE LINE OF

Amateur and Kodak Specialties



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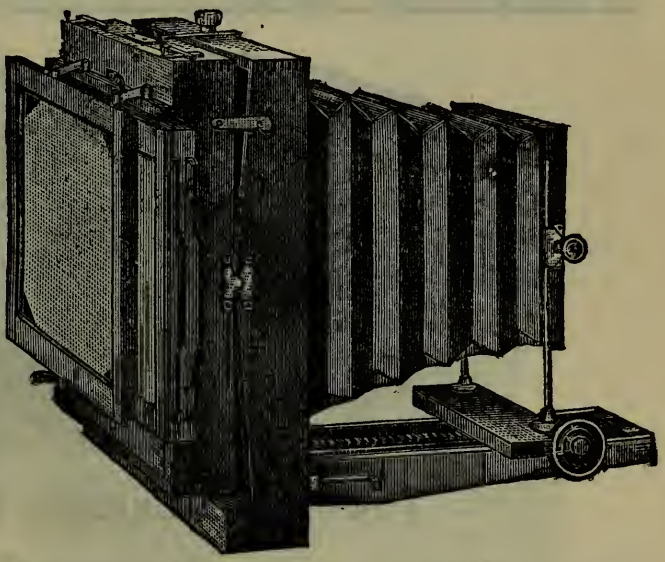
AMERICAN

OPTICAL CO'S Star View CAMERAS.

(PATENTED.)

The Star Reversible Back Cameras have the patent reversible back, with automatic latch, which allows Holder to be inserted without holding back the ground-glass frame, the rack and pinion movement, and the *patent latch* for making the bed rigid instantaneously.

Each Camera is supplied with one Daisy Holder with *patent Registering Slides* and canvas case.



STAR REVERSIBLE-BACK CAMERAS.	Double Swing-back.	Double Swing-back.
No. 110— 4 x 5	$25 00	$29 00
" 111— 4¼ x 5½	26 00	30 00
" 112— 4¼ x 6½	30 00	34 00
" 113— 5 x 7	32 00	35 00
" 114— 5 x 8	34 00	38 00
" 115— 6½ x 8½	36 00	40 00
" 116— 8 x 10	40 00	44 00
" 117—11 x 14	60 00	64 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

The largest Photo Supply House and Picture Fame Factory in Western Pennsylvania.

A COMPLETE LINE OF

PHOTOGRAPHIC GOODS,

PICTURE FRAMES

AND MOULDINGS

OF ALL KINDS CONSTANTLY ON HAND.

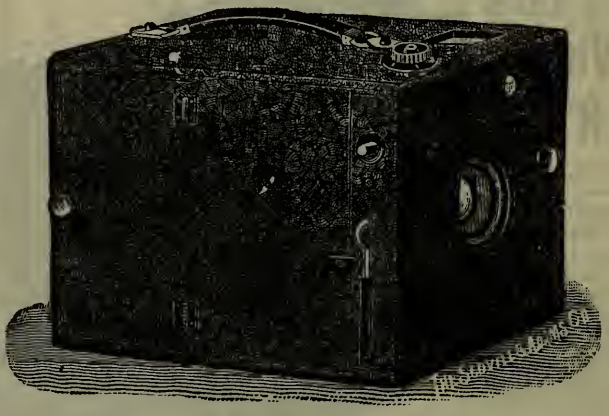
Best Goods and Lowest Prices. Your Patronage solicited and satisfaction guaranteed.

BROUDE MANUFACTURING COMPANY,

OFFICE AND WAREROOMS:

242, 244 and 246 Fifth Avenue, 21, 25 and 27 Watson Street,

Telephone, 1356. PITTSBURGH, PA.



The Triad Camera Box,

Is fitted for a ROLL-HOLDER, GLASS PLATE-HOLDER and FILM-HOLDER.

It is made by the American Optical Company, and so stamped.

COMPACT, LIGHT, DURABLE.

Look at one before you purchase any other.

PHOTO-PRINTING FOR AMATEURS AND THE TRADE.

BROMIDE ENLARGING A SPECIALTY.

Films and Plates Developed.

Photos, etc., copied with greatest care.

Only First-Class Work done.

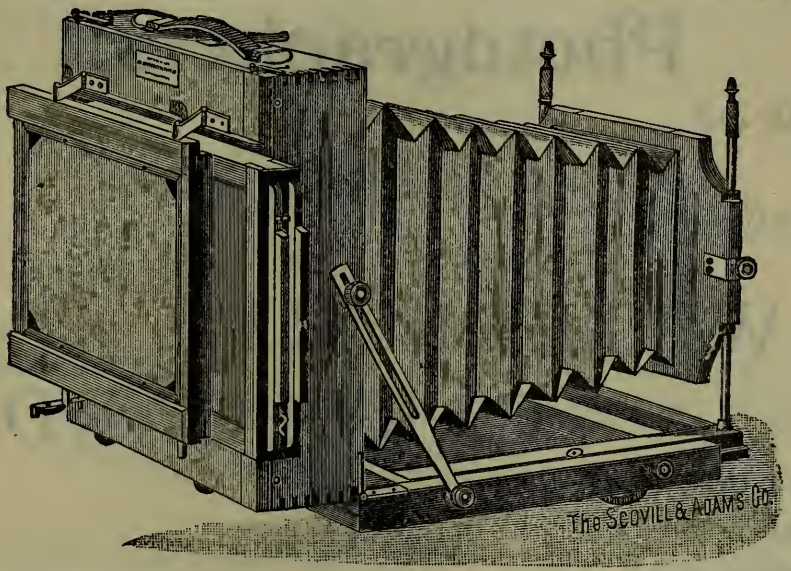
OUT OF TOWN ORDERS PROMPTLY ATTENDED TO

JOHN A. POLLOCK,

198 WILLIAM STREET,

Cor. Frankfort Street, NEW YORK.

THE COMPACT VIEW OUTFITS.



These Outfits comprise a Compact View Camera—which is a polished Mahogany box—with patent reversible swing-back, with turn-table on platform, and with raising front which can be set back on platform when Camera is used with a short-focus lens.
One Canvas Carrying Case for Camera.
One Scovill Adjustable Tripod.

PRICE LIST.

5 x 7 Compact View Outfit.....	$20 00	6½ x 8½ Compact View Outfit.....	$25 00
5 x 8 " " "	22 00	8 x 10 " " "	30 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

S. TRIER & SON,

Manufacturers of

PHOTOGRAPHERS'

CARD STOCK,

546 PEARL ST., NEW YORK.

The attention of the Trade is called to our Superior Qualities and Low Prices.

SEND FOR CATALOGUE.

Photographers!

Look out for imitations of

WATERBURY CARDBOARD.

Look out for the genuine, too, and see that you get it.

It is the Best and Cheapest.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

NEW YORK PHOTOGRAVURE CO.,

No. 137 WEST 23d STREET, N. Y.

PHOTOGRAVURE.

PHOTOGELATINE.

HALFTONE. . .

ERNEST EDWARDS, PRESIDENT, Inventor of the Heliotype Process. Manager, Heliotype Printing Co., Boston, from 1872 to 1886.

W. R. STANBERY; SECRETARY.

"SUN AND SHADE,"

An Artistic Periodical.

ART DIRECTOR, A. V. S. ANTHONY, for many years Art Director for Ticknor & Fields, and Fields, Osgood & Co.

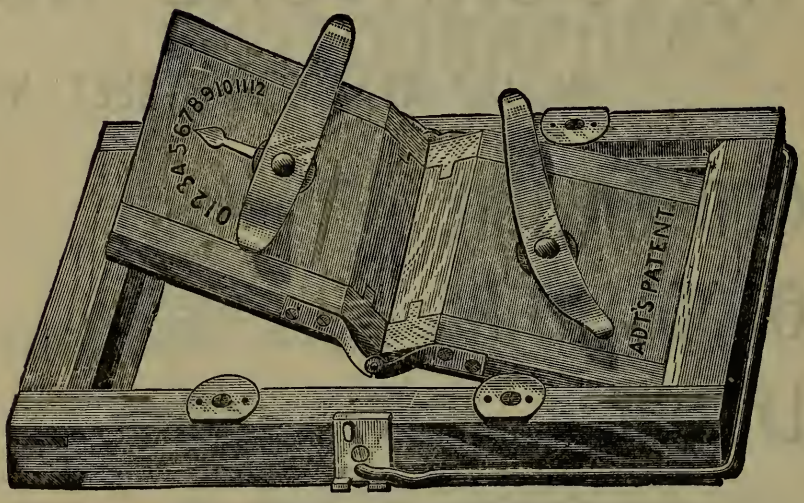
"Plates of the highest merit both in design and execution."
—*The Independent*, New York

"The highest level of achievement in photogravure work."
—*The World*, New York

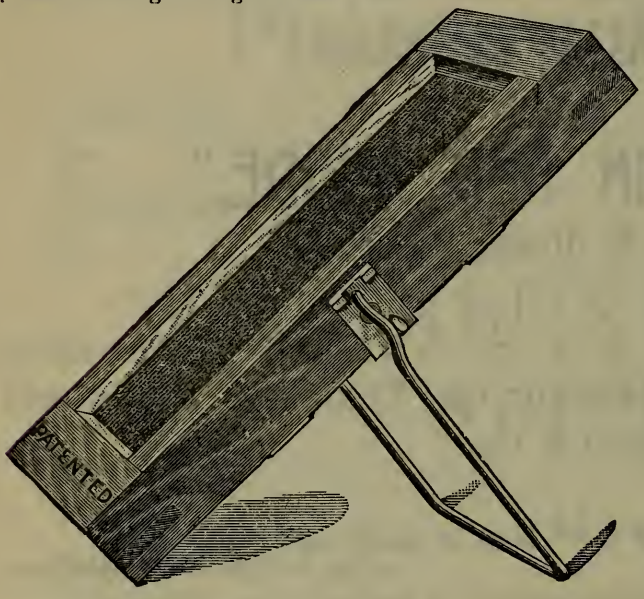
"Photogravures of the highest quality."—*The Herald*, New York.

"Possessing the quality of drawing in India Ink or Sepia."
—*The Sun*, New York

ADT'S PATENT PRINTING FRAMES.



These Frames are now supplied (without extra charge) with Adt's Patent Support with which the frame can be stood on either end, and at four different angles, for exposure while printing. It is out of the way of the printer when introducing the paper, or examining the print, for when the frame lies or is held with back up, the support instantly drops upon its stops for rest, and is entirely out of the way of the hand of the printer, so that he may remove or open the back-board, or replace it, as if there were no support present. Being arranged close around the sides and ends of the frame, it occupies so little space as not to interfere with the packing or storage of the frames, and when the printer places his frame for exposure the support readily finds its position for supporting the frame without any special manipulation.



PRICES.

3¼ x 4¼	$0 50
4 x 5	50
4¼ x 5½	50
4¼ x 6½	60
5 x 7	65
5 x 8	65
6½ x 8½	75
8 x10	85
10 x12	1 15
11 x14	2 15
13 x16	2 40
14 x17	2 80

When made with back to open lengthways, an additional charge of 10 per cent. will be added to the above prices.

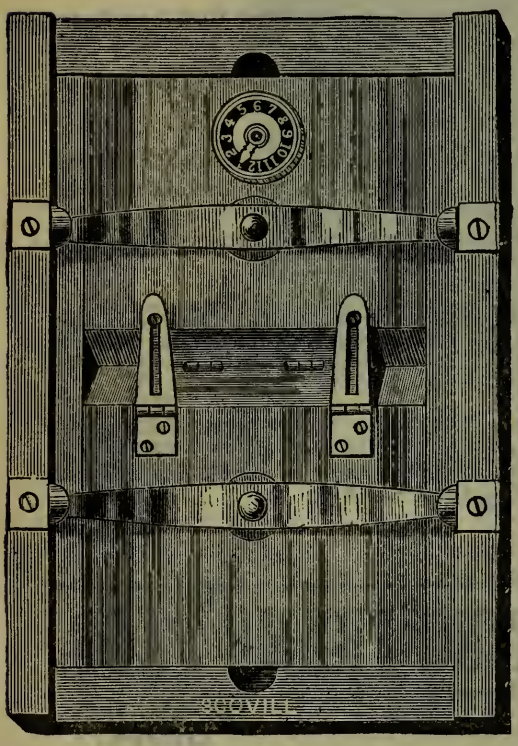
As will be seen by a glance at the cut, the adjacent edges of the parts of the back-board are beveled outward, and the hinges placed on the sides with their axes on a line with the surface. This permits the attachment to the face of the back-board of a **Heavy, Continuous Elastic Felt Pad.** This obviates the necessity of using a separate pad, which is so easily misplaced and lost.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

IRVING PRINTING FRAMES

WITH ADJUSTABLE SUPPORTS.

(PATENTED.)



IRVING PRINTING FRAME, CLOSED
FRONT VIEW.



IRVING PRINTING FRAME, OPEN.
BACK VIEW.

The IRVING FRAMES have valuable features which cannot be copied. They are in workmanship, design, and other respects, superior to all other printing frames.

The continuous felt pads made especially to order for us, insure absolute protection and uniform pressure throughout. The Irving Patent Catches lock the back, so that when one flap is open there is not the slightest danger of the flaps, paper or negative slipping.

The springs are cut by dies of specially tempered and tested metal, and are riveted to the backs with washers underneath to protect the woodwork.

The IRVING FRAMES are made of cherry guaranteed not to warp or crack.

The tally does not depend upon any other part of the frame to lock it, for the pointer will remain in place no matter what is done to other parts of the frame.

Prices for Half or Two-thirds Opening Styles.

3¼ x 4¼	$.45	5 x 7	$.60
4 x 5	.48	5 x 8	.65
4¼ x 5½	.50	6½ x 8½	.70
4¼ x 6½	.55	8 x 10	.80

When made with backs to open lengthways, ten per cent. is added to the foregoing prices, for the respective sizes.

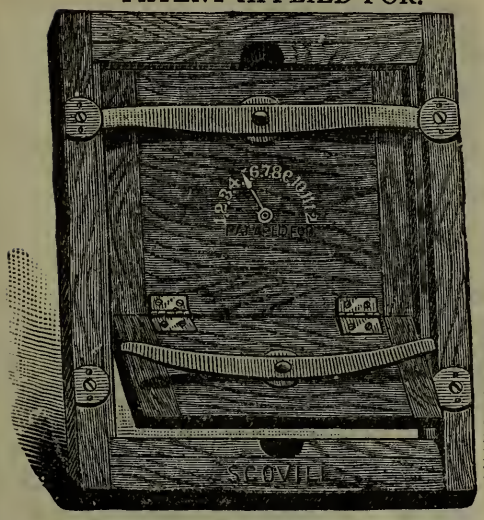
For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

SCOVILL PRINTING FRAMES

ARE NOW MADE WITH TALLY.

The Scovill Printing Frames are made of cherry, and have superior brass springs constructed on scientific principles. On the flat printing frames, these springs are secured by rivets and turn on brass washers, being held at the end by buttons made so that they cannot turn around.

PATENT APPLIED FOR.



SCOVILL FLAT PRINTING FRAMES.

They are so constructed that a uniform pressure is obtained, thus insuring perfect contact between the paper and the negative, and removing the danger of breaking the latter.

The back-boards are also so arranged that the progress of the printing may be watched without danger of shifting the paper, and each frame has the tally shown in the illustration.

For Plates.	Regular Flat or Two-Thirds.	Deep.
3¼ x 4¼	$0 36	$0 75
4 x 5	38	75
4¼ x 5½	40	75
4¼ x 6½	42	85
5 x 7	50	95
5 x 8	52	95
6½ x 8½	60	1 25
8 x10	75	1 60
10 x12	1 00	2 00
11 x14	2 00	2 50

For Plates.	Regular Flat or Two-Thirds.	Deep.
13 x 16	$2 25	$2 75
14 x 17	2 45	3 00
16 x 20	4 50	4 75
17 x 20	4 50	4 75
18 x 22	5 00	5 25
20 x 24	5 50	5 50
24 x 30		9 00
35 x 45		16 00
30 x 60		22 00

The SCOVILL PRINTING FRAME PADS.

FOR	1st Quality, GRAY.
3¼ x 4¼ Frames, in boxes, per doz.	$0 24
4 x 5 " " "	33
4¼ x 5½ " " "	36
4¼ x 6½ " " "	38
5 x 7 " " "	54
5 x 8 " " "	57
6½ x 8½ " " "	84
8 x 10 " " "	1 44
10 x 12 " " "	2 16
11 x 14 " " "	2 88
14 x 17 " " "	4 08
16 x 20 " " "	5 04
17 x 20 " " "	5 28
18 x 22 " " "	6 48
20 x 24 " " "	8 40

The above goods are very desirable, and the demand for them is increasing. They are put up in boxes containing one dozen pads each.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

SCOVILL'S GLOSSY RUBBER TRAYS.



After a protracted and costly series of experiments, we are now able to offer to the trade, a superior article in texture, durability and polish. The utility of the parallel ridgelets must at once be apparent to the photographic practitioner.

PRICE LIST.

Size.		Price, Each.
No. 200, $4\frac{3}{5}$ x $5\frac{5}{8}$ for 1-4, 4-5, and $4\frac{1}{4}$ x $5\frac{1}{2}$	plates	$0 28
" 300, $5\frac{1}{2}$ x $8\frac{1}{2}$ for 5 x 7 and 5 x 8	"	56
" 400, 7 x 9 for $6\frac{1}{2}$ x $8\frac{1}{2}$	"	72
" 500, $8\frac{1}{2}$ x $10\frac{1}{2}$ for 7 x 9 and 8 x 10	"	1 08

CELLULOID TRAYS.



Size.					Price, Each.
$4\frac{1}{4}$x $5\frac{1}{2}$	For 4	x 5	Plates		$0 50
$5\frac{1}{2}$x $8\frac{1}{2}$	" 5	x 8	"		72
7 x 9	" $6\frac{1}{2}$	x $8\frac{1}{2}$	"		85
$8\frac{1}{2}$x$10\frac{1}{2}$	" 8	x 10	"		1 15

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

Keating Wheel Co.

Highest Grade, *LIGHT, STRONG and DURABLE.*

SOLE AGENTS,

1775 Broadway, *New York.*

THE IOTA CELLULOID TRANSPARENCY FILMS

Is just what you have been looking for. Printed out in sunlight, toned and fixed in any good bath. There is no guess-work; you can see what you are doing and get any tone desired. The results are far superior to the old method in every way.

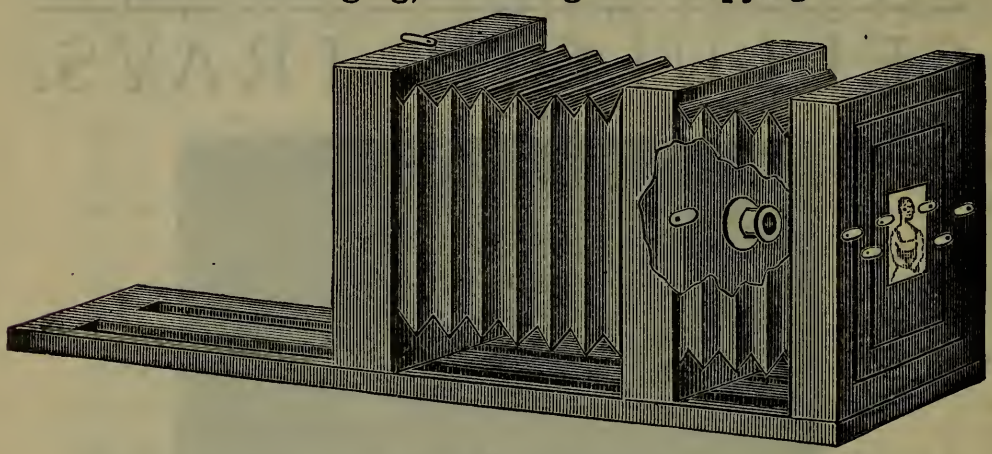
Sample Package of Films, 25c. Sample Transparency 15c.

Send for complete direction for the use of the Iota Specialties and Price List.

Sample Print on Iota Sensitized Paper, 10 cents.

GEO. H. CHASE & CO., Newport, R. I.

The Scovill Enlarging, Reducing and Copying Cameras.



When ordering, please specify number and sizes of kits, also style of Holder wanted.

No. 61.–Size,	6½x8½	Price,	$30.00
" 62. "	8x10	"	35.00
" 63. "	10x12	"	48.00
" 64. "	11x14	"	60.00
" 65. "	14x17	"	72.00
" 66. "	17x20	"	90.00
" 66½. "	18x22	"	100.00
" 67. "	20x24	"	110.00

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WE HAVE PROBABLY THE LARGEST ASSORTMENT OF
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ONE OF OUR OPERATORS HAS RECENTLY RETURNED
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WITH OVER
500 NEW SUBJECTS.

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WE HAVE
A RARE COLLECTION OF
AMERICAN AND
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BOTH IN
SILVER AND
PLATINUM PRINTS,
HANDSOMELY
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A LARGE stock of KODAKS, HAWKEYES, KAMARETTS, and all Detective Cameras constantly on hand.

Kodak Films developed and printed at Eastman & Co.'s prices.

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No. 18 Spruce Street,

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HALF-TONE PLATES from Photographs, Wash Drawings, etc., etched direct on copper plates by improved methods.

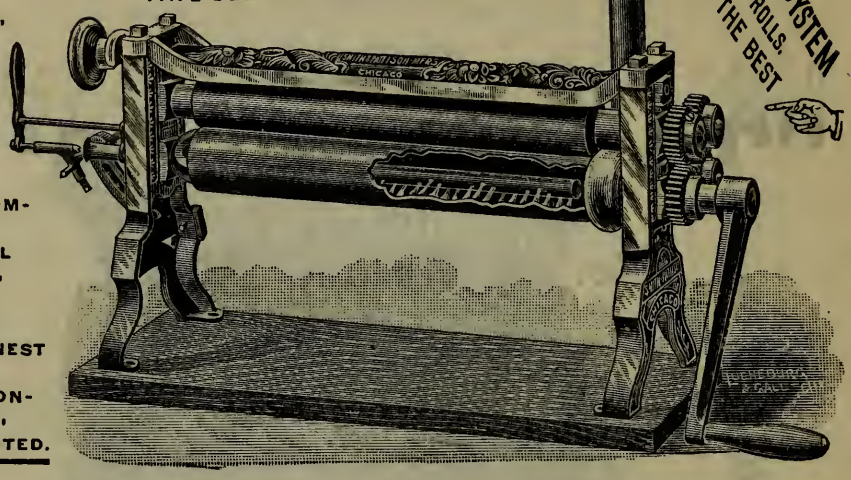
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NO SMOKE,
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NO LUBRICATING,
QUICKEST HEATER,

THE GLOBE ENAMELER

PAT^{D} JUNE 1.86 & AUG. 28.88.

NOTICE THE QUADRUPLEX SYSTEM OF GEARING ROLLS. IT IS THE BEST



NO DISCOMFORT,
BEAUTIFUL DESIGN,
ELEGANT FINISH,
GIVES FINEST GLOSS,
MOST ECONOMICAL,
WARRANTED.

Constructed with hollow roll, having gas or gasoline burner inside, which heats roll in three to five minutes. Heat is under perfect control. Roll never sweats; never scratches. Pressure adjusted with one-hand wheel, and is always uniform. Superior to all others in all respects.

What Purchasers and Users Say of it:

"It affords me pleasure to testify that your Globe Enameler has **no equal.**"
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"Have used Globe Enameler six months. It has saved its cost in gas, and is a world-beater." - - - - Edward Fritz & Co., Sedalia, Mo.

"Globe Enameler is the best I ever used. I consider all others 'not in it.'"
G. S. Barr, Mendota, Ill.

"Globe Enameler works beautifully. Such a relief from rust, oil, and sweaty rolls." - - - - - - - E. R. Curtiss, Madison, Wis.

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"Have used a dozen different Burnishers, but your Globe Enameler is worth more than all of them." - - - W. A. Armstrong, Milwaukee, Wis.

"Have used your Globe Enameler during the past year and would not part with it." - - - - - - - F. W. Guerin, St. Louis, Mo.

"The Globe Enameler is all that we could ask for. **It has no equal.**"
Lemuel E. Friend, Birmingham, Ala.

"Cannot say too much in praise of the Globe. It beats them all."
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We could furnish hundreds more of equally emphatic testimonials, but we have not the space for them. Every purchaser is delighted with it.

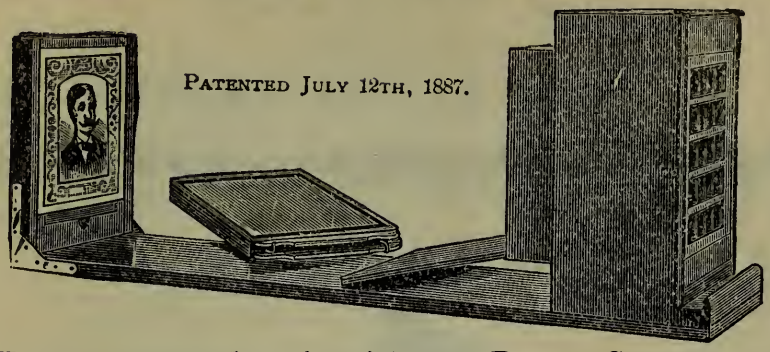
Prices—10 in., $30.00; 15 in., $40.00; 20 in., $50.00; 25 in., $60.00.

Either Gas or Gasoline Heaters included. For sale by all dealers. Send for circulars.

JAS. H. SMITH & CO., Manufacturers,

186 Wabash Avenue, CHICAGO, ILL., U. S. A.

Hyatt's Stamp Portrait Camera.



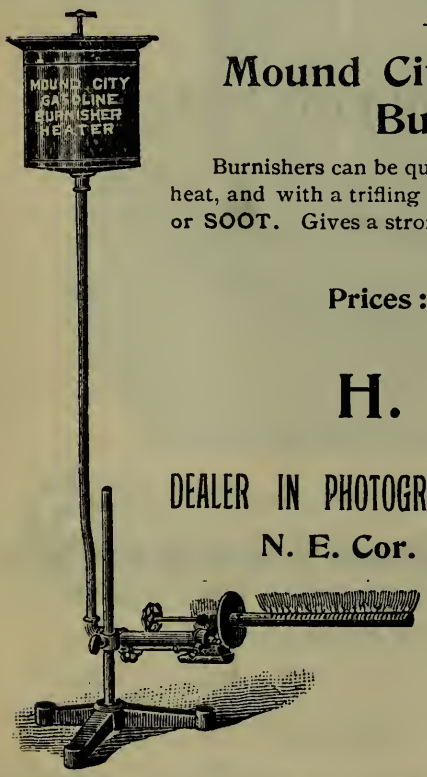
PATENTED JULY 12TH, 1887.

We are prepared to furnish our Patent Stamp outfits to the trade. No enterprising photographer should be without one; it will increase your business, advertise you and help you financially.

Prices, with right for using same:

Stamp Size, with 25 lens, for making 25 on 5x7 plate	$50.00
Minette " " 8 " " 8 on 5x8 "	40.00
Stamp " " 16 " " 16 on 4x5 "	25.00
Minette " " 4 " " 4 on 4x5 "	25.00
Combination Stamp and Minette for making 16 Stamps, or 4 Minettes on 4x5 plate	40.00
Perforators for perforating same, under our stamp patent issued July 12, 1887	35.00

Stamp Photos furnished for the trade. Full particulars sent on application.



Mound City Adjustable Gasoline Burnisher Heater.

Burnishers can be quickly heated and kept regulated to any degree of heat, and with a trifling expense, and no **GREASE, SMOKE, SMELL** or **SOOT.** Gives a strong, steady heat. Simple and economical.

Prices:

10-inch Burner, -	$5.00
15-inch Burner, - -	5.50
20-inch Burner, -	6.00

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DEALER IN PHOTOGRAPHIC SUPPLIES OF EVERY DESCRIPTION,

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OUR MAMMOTH ILLUSTRATED CATALOGUE
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BARGAIN LIST MAILED ON APPLICATION.

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ROCHESTER, N.Y.

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PHOTOGRAPHIC LENSES,

MICROSCOPES,

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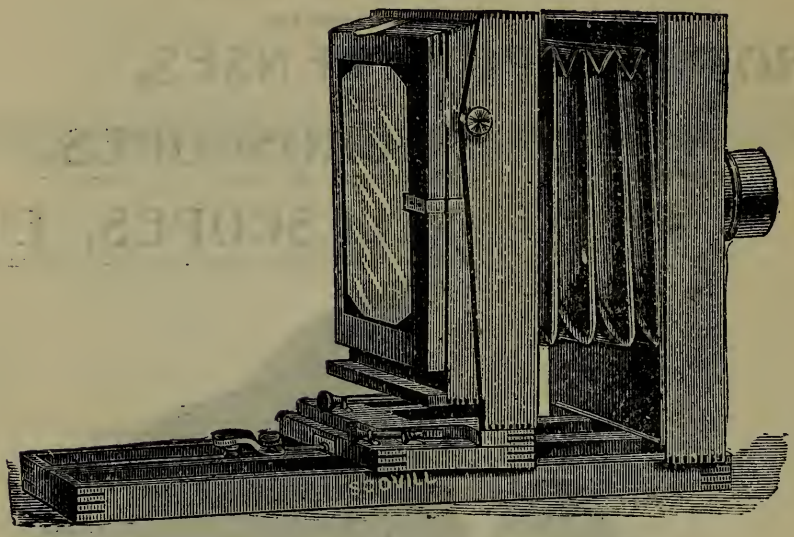
OUR Photographic Lenses are unrivalled in their excellence and are used by many of the most celebrated Photographers throughout the world.

We manufacture High-Grade Lenses for every branch of photography.

Send for Illustrated Catalogue, either to your stock dealer or to the

GUNDLACH OPTICAL CO.

"PEERLESS" PORTRAIT CAMERAS.



These Cameras are made of seasoned mahogany, well polished. Above 10 x 12 size they have the Telescopic Extension Platform, Double Swing Back, and are classed among the finest instruments that are made at our New Haven Factory.

These Cameras are either fitted with Bonanza Holder with Dry-Plate Rail in addition to the Wet-Plate Trough, or they are fitted with plain Rabbeted Holder.

The Price List is as follows:

SIZE.	PRICE.
8 x 10, with Plain Platform	$30 00
10 x 12, " " "	42 00
11 x 14, " Extension Platform	60 00
14 x 17, " " "	70 00
17 x 20, " " "	84 00
18 x 22, " " "	90 00
20 x 24, " " "	100 00

THE SCOVILL & ADAMS CO., Manufacturers.

CRAMER'S ISOCHROMATIC PLATES

surpass all other plates of equal rapidity, in sensitiveness to yellow, orange and green.

The Instantaneous and Medium Isochromatics

are unexcelled for portraits, landscapes and general work, yielding negatives of superior quality without the use of a color screen. *Try them to be convinced.*

They develop and fix very readily, needing no extra precaution other than to protect them carefully against too much light while developing.

The **"Slow" Isochromatic** is particularly recommended for the reproduction of paintings, where the fullest sensitiveness to colors is imperative.

Cramer's Lightning Plates

The highest prizes at our latest conventions were carried off by photographers using these plates. They have been greatly improved, and now combine the fine qualities for which the Cramer plates are renowned, with the greatest ease in developiug and fixing.

No trouble to make bold and brilliant negatives.

The "Anchor" Brand is suitable for landscapes, copying and photo-mechanical work.

The "Banner" Brand takes the lead for general portrait work, combining high sensitiveness with great latitude in exposure.

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TRANSPARENCY PLATES, FOR LANTERN SLIDES.

STRIPPING PLATES, FOR PHOTO-MECHANICAL WORK.

MANUFACTURED BY

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For Sale by all Dealers in Photo Supplies.

BAUSCH & LOMB OPTICAL CO.

Manufacturers of the Popular American Standard

RAPID UNIVERSAL LENSES,

for Group work in Studios and all outdoor work, and

ALVAN G. CLARK LENSES,

on both of which there has been a decided reduction in prices.

The New and Wonderful

ZEISS-ANASTIGMAT LENSES,

of which we are the Sole American Manufacturers. In three Series, for Studio, Architecture, Landscape and Copying.

DIAPHRAGM SHUTTER,

which stands without rival.

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DOUGLASS & SHUEY COMPANY.

AMATEUR PHOTOGRAPHERS patronize us, not only because we are **recognized headquarters**, but because we have the **latest, freshest** and **best** of

Everything used in Photography.

And our **professional friends** send us their orders because they have learned that we are never behind, but usually ahead of our competitors in our ability to cater to their wants.

Visitors to the World's Columbian Exposition who are interested in photography, are cordially invited to make their headquarters at our commodious salesrooms, where they will be more than welcome, and where they may have the free use of our dark-rooms.



The best "Black Band" Lens made is our new Rapid Rectilinears the prices of which have been reduced as follows:

	REDUCED FROM	NOW
4 x 5	$15.00	$10.00
5 x 8	25.00	15.00
6½ x 8½	30.00	20.00
8 x 10	40.00	25.00
10 x 12	50.00	35.00
12 x 15	60.00	45.00
16 x 20	75.00	60.00

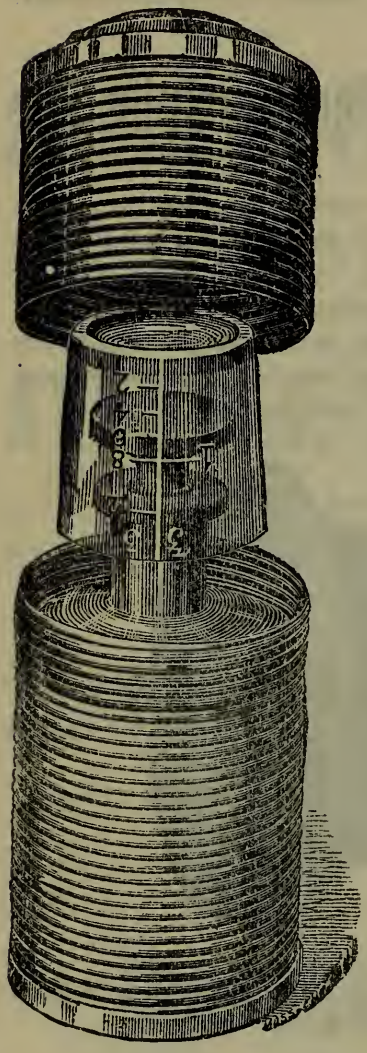
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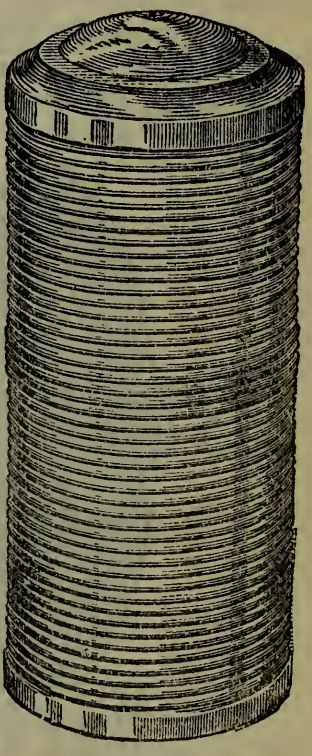
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CORRUGATED PROTECTING CASES,



Supplied with Cut Glass Bottles, and Graduated Tumbler to Measure Liquids.

Corrugated Protecting Cases are a great convenience to the landscape photographer and amateur picture-taker when away from home. Though made of thin metal, the corrugation makes them so strong as to resist crushing. Being nickeled and finely finished, the external appearance of these Cases is



Decidedly Tasteful,

indeed, one would be more inclined to place them in a satchel than in a packing case. Whether carried about in a horizontal or vertical position, the locking ring affords perfect protection for the liquids contained in the bottle.

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PORTRAITS & FRAMES OF EVERY DESCRIPTION.

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Promptness and Excellence make steady Patrons.

Crayons, Sepia Crayons, Pastels, Water Colors, India Ink and Oil. Enamel Argentic and Bromide Prints.

Our specialty is genuine Stipple and high grade work, but if you are obliged to compete with cheap work we can furnish you with it. We make prints cheaper and better than you can make them yourself. Send for 1893 Catalogue and trial order.

ESTABLISHED 1840. UNEXCELLED.

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STEREOSCOPIC OUTFIT

For Instantaneous or Timed Exposures.

WE ARE NOW CONSTRUCTING STEREOSCOPIC OUTFITS CONSISTING OF

A 5-8 Stereoscopic Camera,
One pair matched Waterbury "A" Lenses fitted with the Stereoscopic Elite Shutter,
One 5-8 light-weight double Dry-Plate Holder.
One No. 2 Scovill Extension Tripod,
One Wood Carrying Case,

For the moderate price of $27.00.

We will furnish a pair of matched Waterbury A Lenses, fitted with the Stereoscopic Elite Shutter, for - - $20.00.

The ELITE SHUTTER recommends itself on account of its simplicity of construction, rapidity of motion, and its extremely low price.

The WATERBURY A LENS, with stop f /25, covers a stereoscopic plate to perfection, and with a plate of average high sensitiveness will produce correct exposure by the very rapid speed of the "Elite."

The Shutter is arranged for instantaneous as well as timed exposure, is neatly and accurately made, and does not get out of order.

For sale by all dealers in photographic goods, and the manufacturers,

The Scovill & Adams Company, 423 Broome St., New York.

Two New Shutters.

"The Simplex."

An excellent shutter for both *Time and Instantaneous* Exposures. Examine one before purchasing.

Price, only $13.50 net cash.

"The Elite."

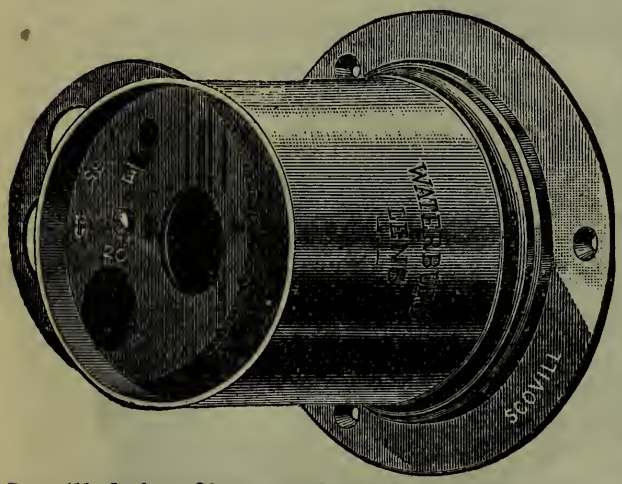
A remarkable shutter for the money. Works splendidly. Never fails. Send for Descriptive Circular.

Price, $3.50.

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WATERBURY LENSES.



THE Waterbury Lenses are composed of a bi-convex crown glass lens cemented to another lens of the plano-convex form, made of the best selected flint-glass.

Owing to the great advances in the sensitiveness of emulsion plates, the Waterbury Lenses are now commonly used for groups and for instantaneous views, with the Scovill Safety Shutters described on another page.

A, Single, for 4x5 plate	$3 50
A, Matched pair, stereoscopic	7 00
B, Single, for 5x8 plate	4 50
B, Single, with patent shutter	5 50
BB, Single, for 6½x8½ plate	6 00
C, Single, for 8x10 plate	8 00

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(EVERY SHEET GUARANTEED.)

WITHOUT large advertising or expensive demonstrating is rapidly taking the lead.

MERIT alone can do this, and users of bromide paper who are ambitious to make the highest standard of work are asked to give it a trial.

RESULTS that have not heretofore been expected with this article, are possible with this brand. Its delicacy of half-tones renders it peculiarly suitable for producing the warm or sepia tones. Formula sent free.

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The Hoover Patent Rapid Contact Printing Machine furnished to order, PRICE $100,00.

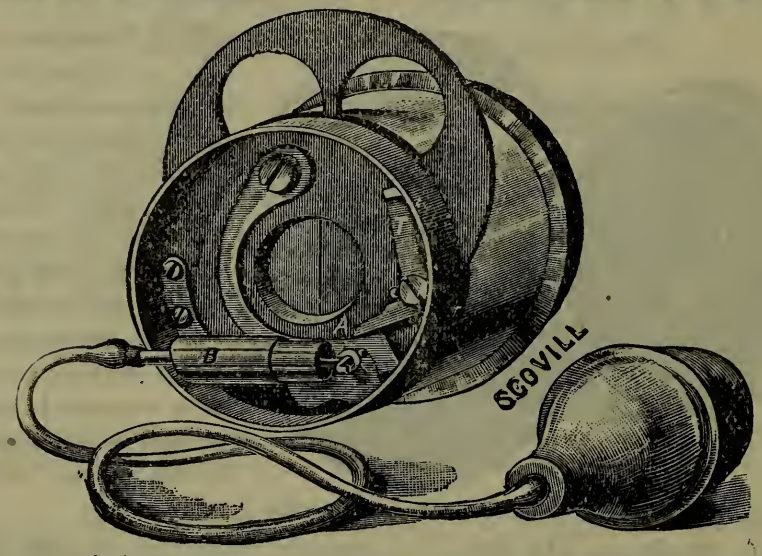
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BUFFALO ARGENTIC PAPER CO.,

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THE ELITE SHUTTER.

Price, **$3.50**



This economical shutter was specially designed for use with the Waterbury Lens.

DIRECTIONS FOR USE:—To set the shutter for snap work, push the point A as close to the piston B as it will go. Push arm T as close to the edge of the lens as possible. The shutter is now set for quick work. When ready to expose, give a hard, quick squeeze on the bulb.

FOR TIME EXPOSURE:—Press arm T as close to centre of lens as it will go. Push the point A close to the piston B. For exposure, squeeze and hold the bulb, which will open the shutter; when the time of exposure is up, release the pressure upon the bulb and the shutter will close.

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STEPHEN B. BUTTS. JOHN F. ADAMS.

BUTTS & ADAMS

PHOTOGRAPHIC SUPPLIES

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BUFFALO, N. Y.

THE AIR BRUSH

AND EXTRA PARTS FOR SAME.

The Simplex Shutter

Price, $13.50 NET CASH.

This excellent and new shutter will at once commend itself to all users of the Camera.

It is operated as follows:

To set the Shutter for Quick Work.

Raise knob A, press back knob B, which is attached to the piston. Drop knob A so as to catch and hold this piston. Press down arm D towards the right, until its other end is free from the piston B. Regulate the speed for shutter by placing spring C into any notch which will give the speed required; when ready, press the bulb, and the exposure is made.

For Time Exposures.

Raise knob A, press back knob B as far as it will go, drop knob A in order to hold the piston. To the left, push lever arm D as far as it will go, there release spring C from the notches. When ready for an exposure, press the bulb and hold it pressed as long as the exposure is required, then release it, when the shutter will close.



The shutter is provided with rotary stops (E) whose diameters are 1 in., 5-8 in. and 2-8 in.

The Scovill & Adams Company, 423 Broome St., New York City.

One Eye Witness

is of more weight than ten hearsays. Those who hear speak of what they have heard; those who see, know beyond mistake.

Everyone who has ever tried a RECTISCOPE LENS knows beyond mistake that they are very moderate in price and equal to any lens manufactured, no matter what name may be engraved thereon or how high the price demanded.

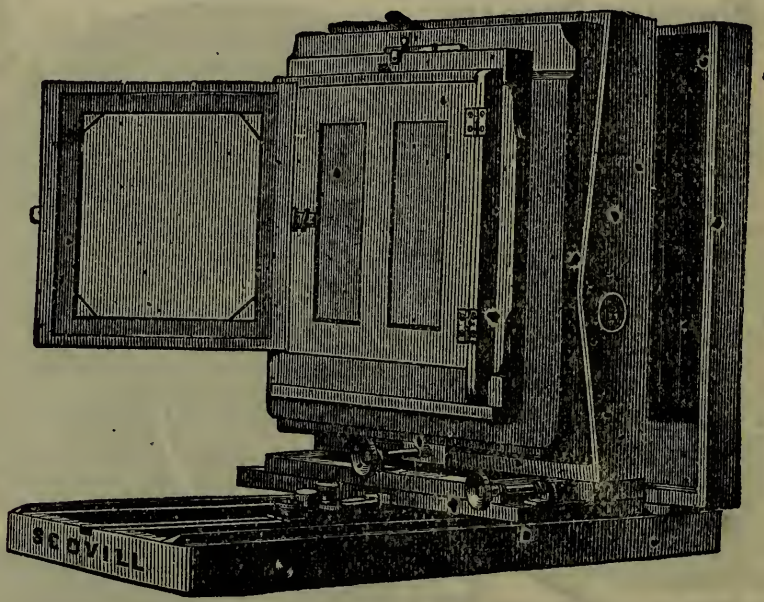
If you are in need of a lens be sure and have a Rectiscope sent on trial.

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Schultze Photo Equip. Co.,

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The American Optical Co.



Boston Imperial Cameras.

The 11 x 14 Boston Imperial Camera is the same as an 11 x 14 Portrait Camera, with the addition of an 8 x 10 Carriage and an 8 x 10 Holder, and is used to make two imperials on an 8 x 10 or 4-4 plate, using one 4-4 lens · two cards on a 5 x 8 plate, using one 1-2 size lens; two large panel pictures, 6 x 10 inches in size, can also be made, and regular work from 11 x 14 to 1-4 inclusive. All with Double Swing-back and Waterbury Holder.

No. 30.—11x14	Boston	Imperial	Camera,	with	8x10	attachment	and	holder, $ 85 00
" 31.—14x17	"	"	"	"	8x10	"	"	100 00
" 32.—17x20	"	"	"	"	8x10	"	"	110 00
" 33.—18x22	"	"	"	"	8x10	"	"	120 00
" 34.—20x24	"	"	"	"	11x14	"	"	140 00

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O. H. PECK, MINNEAPOLIS, MINN.

Photographic Apparatus and Materials

Sole Trade Agent for the COLUMBIAN COLLODION PAPER.

Ask for a Sample Package and satisfy yourself that IT IS THE BEST.

IMPORTER OF **The Peck Portrait and View Lenses.**

These have found great favor and a heavy sale throughout the Northwestern States. If a good Lens is wanted, try it before buying.

WE HAVE A BACKGROUND STUDIO connected with our Stock-house and can, therefore, furnish anything that is wanted in that line. *First-class work at second-class price.*

The Imperial Background Carrier. We manufacture the BEST yet made. Ask for further description.

ONLY $18.00 WITH ONE METAL ROLLER.

AGENT FOR THE **WEDMARK REVERSER,** WHICH NO FERROTYPIST should be without. Write for circular illustrating same.

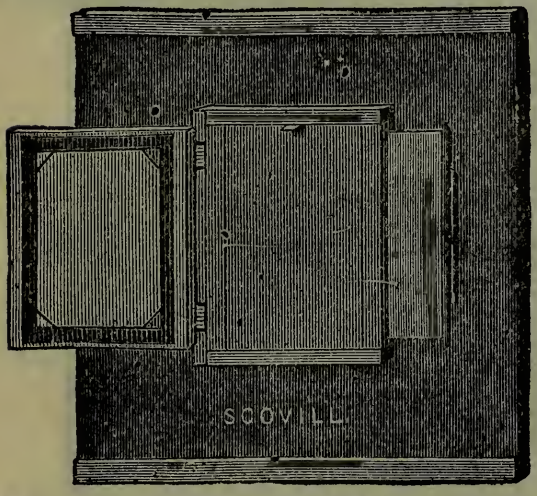
MANUFACTURER OF THE

MURDOCK VIGNETTER,

Which should be used by every Printer.

Sample Dozen for 5 x 7 Frames, $3.00. All sizes to 8 x 10 manufactured.

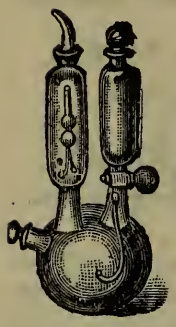
THE AMERICAN OPTICAL CO.'S
CABINET PLATE HOLDER ATTACHMENT



Consists of a board the same size of the plate-holder of the camera. It is put in place the same as holders, upon pegs, with spring catch at top. In center of board is an opening with hinged ground-glass to receive the holder selected, 4¼x6¼, 5x7, or 5x8. Can be fitted to any 8x10 or larger portrait camera by sending exact size of plate-holder. When wishing to use larger plates can be instantly removed. By the aid of this attachment and twelve single light-weight holders you always have a supply of plate-holders loaded and ready for use, save the expense of large extra holders and many a trip to the dark-room, and you are sure of always getting your subject in the proper position on the plate.

For 8 x 10	Am.	Optical	Co.	Best	Portrait	Camera	with	one	single Light-Weight Holder, price, $8 00
" 10 x 12	"	"	"	"	"	"	"	"	" 9 00
" 11 x 14	"	"	"	"	"	"	"	"	" 10 00
" 12 x 15	"	"	"	"	"	"	"	"	" 11 00
" 14 x 17	"	"	"	"	"	"	"	"	" 11 00
" 15 x 18	"	"	"	"	"	"	"	"	" 12 00
" 17 x 20	"	"	"	"	"	"	"	"	" 13 00
" 18 x 22	"	"	"	"	"	"	"	"	" 13 00
" 20 x 24	"	"	"	"	"	"	"	"	" 14 00

EIMER & AMEND,



Chemicals

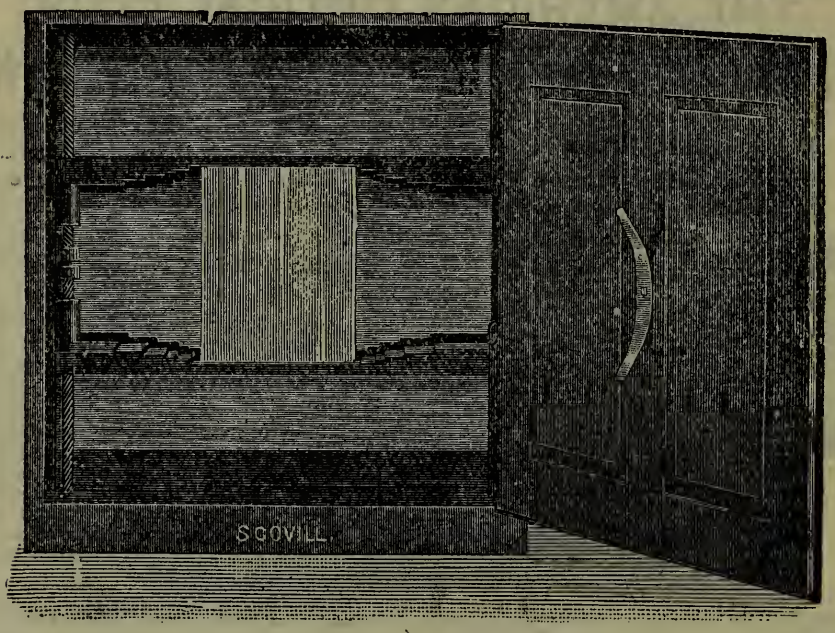
AND CHEMICAL APPARATUS

205, 207, 209 and 211 Third Avenue,

Corner of 18th Street, **NEW YORK.**

C. P. ACIDS AND FINE CHEMICALS FOR PHOTOGRAPHERS.

THE GREAT STUDIO PLATE-HOLDER.



THE WATERBURY HOLDER may be adjusted to various sizes of plates quicker and easier than any other Holder. No kits are required, and the plates used must be in the center, and may be laid in the proper place in the dark.

The WATERBURY HOLDER requires no latches to secure the plate firmly in place. The mechanism is so simple that it cannot get out of order except by destroying the Holder.

The WATERBURY HOLDER adjustments work with entire freedom and yet without vibration or side-play.

The Lanza Holder was acknowledged to be the best wet-plate Holder; and every candid man will admit that the WATERBURY HOLDER is the best dry-plate Holder for gallery use.

This Holder, with Roller Slide, supplied with American Optical Co. Portrait Cameras.

THE ACME TRANSPARENT WATER COLORS,

Especially adapted for
PHOTO-PORTRAIT
COLORING
and Decorating of all
kinds of
PAPER AND CLOTH
FABRICS.



ARE UNRIVALLED FAST COLORS.

16 Colors in large box, price, $2 50 | Amateur box, 6 Colors.....$1 00
(Full instructions in every box.)

ACME MEDIUM, 35c. Send for Descriptive Circular.

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1 4 x 5 Wonder Camera,
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1 Folding Tripod,
1 Double Plate-Holder,
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2 Japanned Iron Trays,
1 Package Hyposulphate Soda,
1 Ruby Lantern,
1 Rubber Focus Cloth,
1 Package Carbutt's 4 x 5 Dry Plates,
1 Package Sensitized Paper,
1 4 x 5 Flat Printing Frame,
1 Jar Paste,
1 Package Mounts, round corners (Crimson),
1 Set S. P. C. Toning Solution,
1 Ounce Graduate,
1 Manual.

No. 2, 4¼ x 6½ size, $10.00. No. 3, 5 x 7, $1[illegible].00.

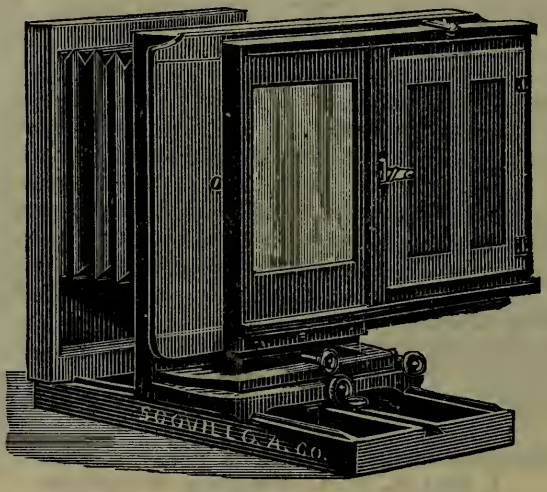
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We have a full stock and can supply your wants promptly. Our prices are reasonable and we do not charge boxing. We have no Catalogue, but sell EVERYTHING Photographic. Cash customers are the ones we want, and to such we give the best prices.

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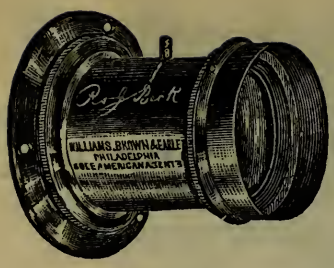


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4 x5	18 75	6½x8½	34 00
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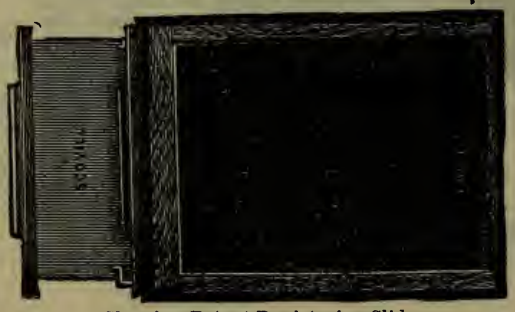


Substantial, serviceable and accurate double holders cannot be made smaller or lighter than the Scovill Light-weight Holders, and though so thin kits may be used in them. They yield a negative *the full width of the plate*, and, what is equally important, the plate may be placed in these holders or removed therefrom *without touching the sensitive surface* and *without danger of breaking it.* Observe the means shown in illustration for locking the slides. They are made with solid frame so that they *will not come apart, leak light, or warp*, and all have the *patent Registering Slides.*

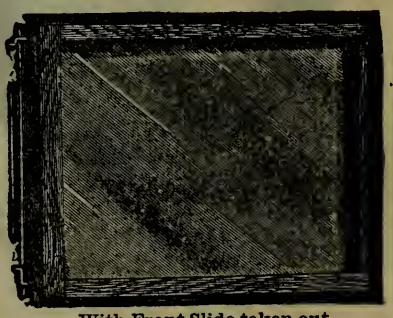
Price Light-weight Double Holder.

3¼x4¼	$1 10
4 x5	1 25
4¼x5½	1 25
4¼x6½	1 25
4¾x6½	1 30
5 x7	1 30
5½x7	1 40
5 x8	1 40
6½x8½	1 70
8 x10	2 00
10 x12	3 50
11 x14	5 00

Patented Nov. 15, 1887, and Jan. 24, 1888.



Showing Patent Registering Slide.



With Front Slide taken out.

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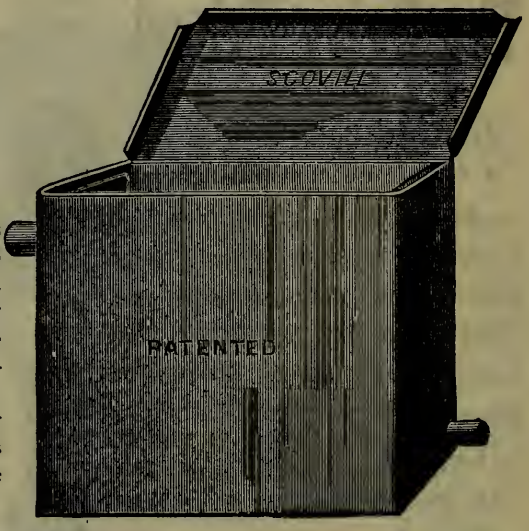
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(*Patented.*)

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		EACH.
For 3¼ x 4¼	Plates	$1 60
" 4 x 5	" and adaptable for smaller sizes	1 75
" 4¼ x 5½	" " " "	1 90
" 4¼ x 6½	" " " "	2 00
" 5 x 7	" " " "	2 10
" 5 x 8	" " " "	2 15
" 6½ x 8½	" " " "	2 25
" 8 x 10	" " " "	2 50
" 10 x 12	" " " "	4 00

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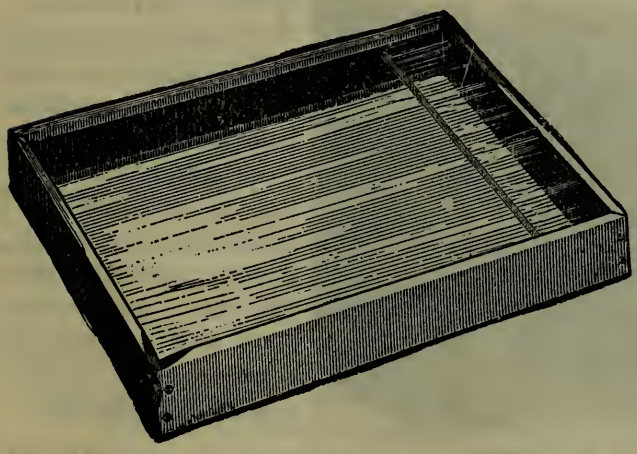
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The Acme Trays are superior to all others in respect to cheapness, durability and cleanliness. They are lined with acid proof cement, and warranted not to leak.

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20 x 24 Trays for silvering whole sheets, without reservoir, but with double-thick glass bottom..... $5 00

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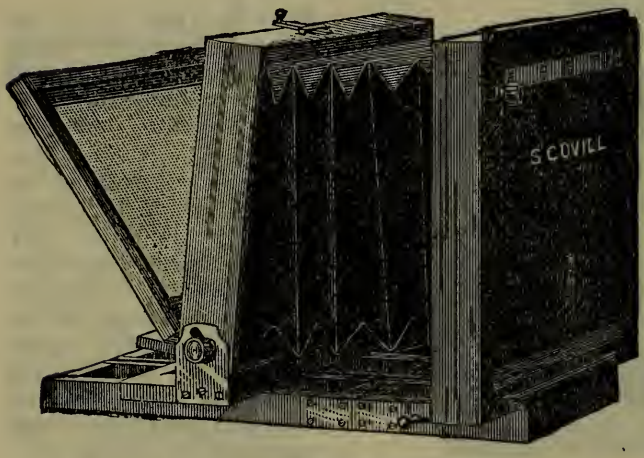
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4 x 5 Waterbury Outfits, Complete **$12.00**

Consisting of single swing Camera, with new style holder, with registering slides (double dry), wood carrying case, Taylor tripod, and No. A Waterbury lens with revolving diaphragm.

4¼ x 5½	**Waterbury Outfits, Complete**			**14.00**
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5 x 7	"	"	"	**16.00**
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6½ x 8½	"	"	"	**21.00**

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THE FLANDREAU CAMERA folds up in so compact a form that the smaller size may be carried in a large overcoat pocket. In fact it embodies the advantages of the Scovill Tourist Camera, with much that is new and improved. The rods which are used to move forward the front of the camera are nicely adjusted, and are polished and nickel plated, so that they add to the handsome appearance of the camera, and contrast well with its polished mahogany surface and the dark hue of its bellows. In addition to this portable arrangement, the Flandreau box is reversible, has a liberal swing-back and front and rising front board. The bellows is cone shaped, and focuses by the forward movement. When closed for carrying the bed becomes a closing front board which is firmly secured at the top by a spring. The tripod head is fastened to this board so that, in adjusting, all that is necessary is to merely lower the front and fasten the tripod legs to the top, which is already secured beneath the board. The swing is held in any position by a new and very clever device. The ground-glass is hinged, as in English cameras, to throw over the top of the instrument.

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1 Scovill Adjustable Tripod No. 1.
1 Canvas Carrying Case.

Price, complete, $20.00.

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All parts of which are Warranted Accurate in every respect.



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5 x 7 " "	12 00	6½ x 8½ " " "	15 00
5 x 8 " "	12 00	8 x 10 " " "	25 00

Favorite Outfits consist of a Favorite View Camera with vertical shifting front, single-swing movement, rubber bellows and folding platform, with patent latch for making bed rigid instantaneously; also, 1 Patent Double Dry-Plate Holder (Reversible), with patent Registering Slides, and with Kits; 1 Taylor Improved Folding Tripod; 1 "Waterbury" Achromatic Lens, with a set of stops, and 1 Carrying Case.

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1—Single Achromatic Lens and
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1—doz. 4¼ x 5½ Gelatine Dry Plates.
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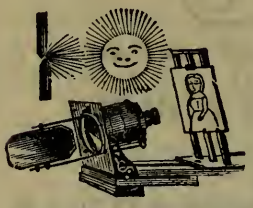
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No. 2 Scholars' Equipment comprises same apparatus, materials, etc., as above, but of size suitable for 3¼ x 4¼ photographs.

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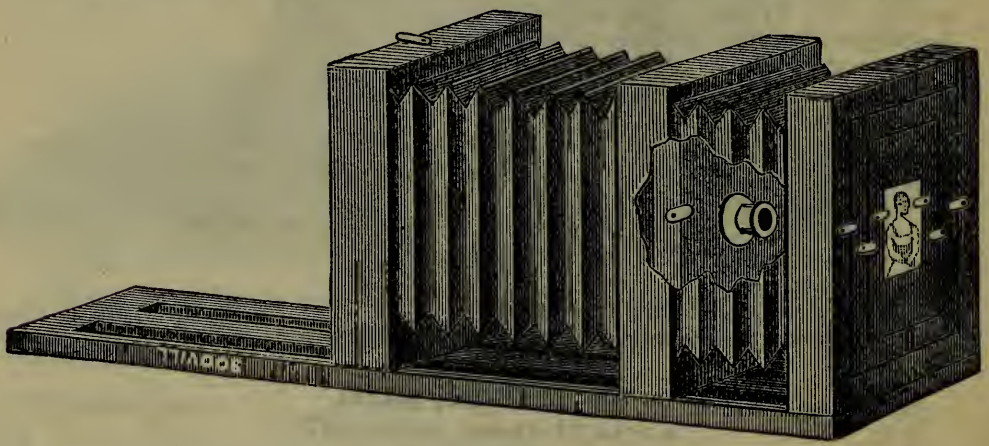
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" 62,	" 8 x 10	"	35.00	" 66,	" 17 x 20,	"	90.00
" 63,	" 10 x 12	"	48.00	" 66½,	" 18 x 22,	"	100.00
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ADAPTABLE FOR VARIOUS SIZE TRAYS.

As will be seen by a glance at the cut, this device not only protects the hands in lifting the plate from the developer, but as they do not come in contact with the tray, stained fingers are entirely avoided.

It is attachable to and will firmly hold various sizes and depths of trays without adjusting.

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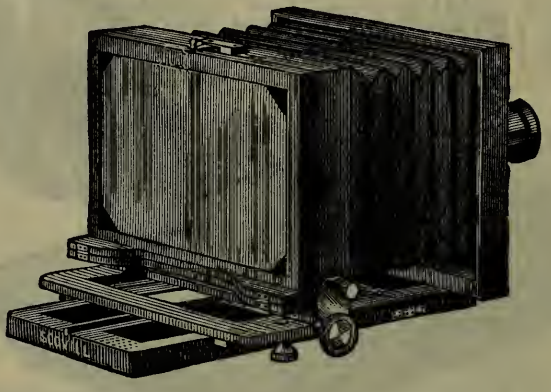
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By means of the side plate the Camera may be reversed when vertical views are desired. To this Camera, which is very light and compact, is fitted one of the incomparable Light Weight Holders, with Patent Registering Slides. The Outfit also comprises

A SCOVILL EXTENSION TRIPOD,
A WATERBURY ACHROMATIC LENS,
WITH REVOLVING STOPS,
AND A CARRYING CASE.

PRICE LIST.

Size of View.		Size of View.	
4¼ x 6½	$17 00	5 x 8	$18 00
5 x 7	17 50	6½ x 8½	22 00

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Patented.

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Darlot Focusing Glass..... 2 50
Scovill's Focusing Glass, each..... 75



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WATERBURY FOCUSING GLASS, each - - 50 cents.

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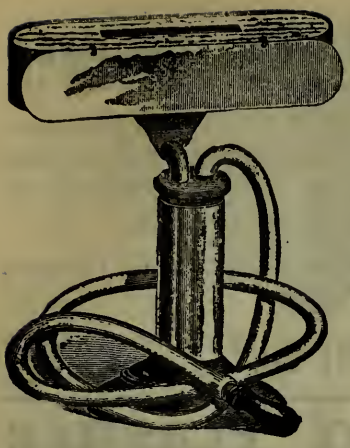
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Camera Box, made by the

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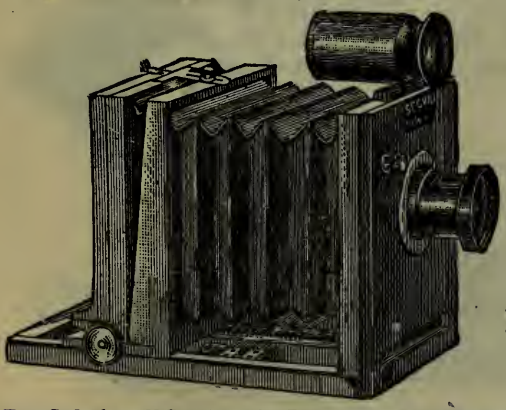
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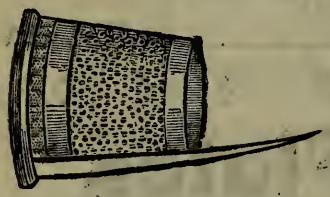
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has been tried with safe "flash" mixtures like the Scovill Magnesium Compound, and invariably has given successful results. There is no device intended to accomplish the same purpose which is so convenient and portable. In fact it folds so compactly that it has been styled the "pocket flasher." A still more important consideration in its favor is that it may be so held as to throw the light downward, and thus avoid shadows. This is very important when flash photographs are made where there are light hangings and wall in the background. Some expert photographers attach a piece of cardboard to the handles of this flasher to serve as a reflector. The Asbestos plates furnished and the use of fuse serve as additional safeguards to the operators.

Price, Handy Flasher, - $0.75

Scovill's Efficient Plate Lifter.



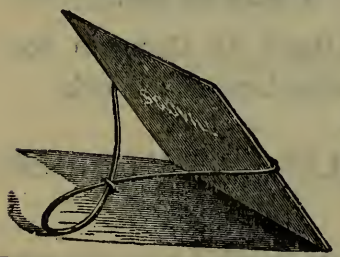
This Plate Lifter is very nearly like an ordinary open end **Thimble** with a **Pointed piece of Metal** soldered securely to it as shown in the illustration.

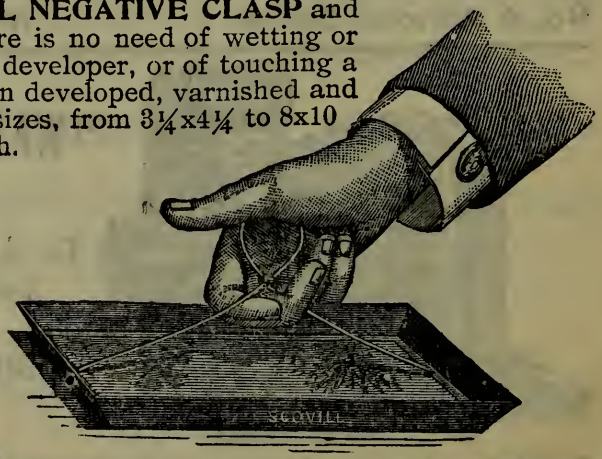
Where a number of plates are developed in one dish, this Plate Lifter is not only a convenience, but quite a necessity.

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By using the **RUSSELL NEGATIVE CLASP** and **DRYING SUPPORT**, there is no need of wetting or staining the fingers in the developer, or of touching a plate until after it has been developed, varnished and dried. Adaptable for all sizes, from 3¼x4¼ to 8x10 inclusive. Price, 15c. each.





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4 x 5,	.20	1.75	10 x 12,	1.00
4¼ x 5½,	.20	1.75	11 x 14,	1.30
3⅞ x 5½,	.20	1.75	14 x 17,	2.10
4 x 6 ,	.25	1.85	16 x 20,	3.00
4¼ x 6½,	.30	3.00	17 x 22,	3.40
5 x 7,	.35	3.50	18 x 22,	3.60
5½ x 7¾,	.40	4.00	20 x 24,	4.00
5 x 8,	.40	4.00	20 x 24, half dozen,	2.00
6½ x 8½,	.60	6.00		
7 x 9,	.65	6.50		

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TONING, except using less gold, is the same as albumen paper ; requiring no extra instructions or work ; producing under all conditions ***permanent prints.***

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Manufacturers of

Photographic Sensitized Papers

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See pages 2, 3.

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THE majority of the Toning Solutions used by Amateurs for Omega and other gelatine papers now on the market bears our name and above cut.

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The "Regular" Kodaks make 100 pictures without reloading, and have the improved register for counting exposures. Best finish. Best Lenses.

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NOTE.—The price includes spool of 60 exposures only.

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The Junior Kodaks are the most compact cameras made. A perfect marvel of convenience; fitted with the improved **register** for **counting exposures.** Junior Kodaks can be fitted for glass plates when desired. Best finish. Best Lenses.

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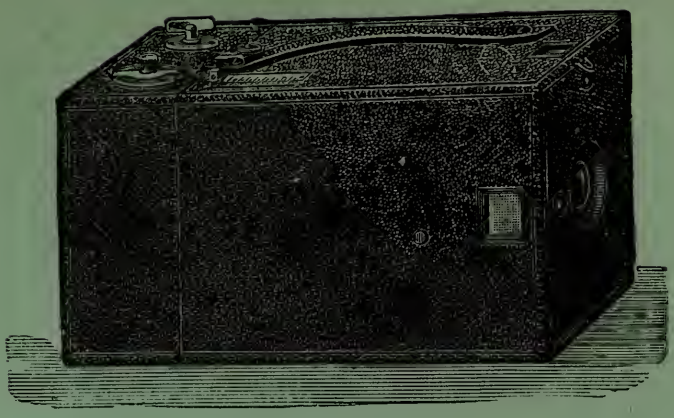
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